



Sedna Centre ᓴᓄᑦ ᐃᑦᓄᓄᐱᑦᐱᑦ
Oil Spill Response Centre of Excellence

A Submission to Finance Canada for Budget 2016

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Submitted by:

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Executive Summary

C-CORE, a Newfoundland and Labrador-based Canadian not-for-profit research, development and innovation (RDI) organization with an international reputation for harsh environment research and technology development, is positioned to establish and operate the Sedna Centre, a centre of excellence for oil spill response research, technology development/testing and training. The Sedna Centre will provide Canada the knowledge, tools and capabilities to respond to oil spills in its vast and varied ocean estate. Sedna Centre programs will help protect the environment, supporting responsible, sustainable marine transportation and resource development. Leveraging national and international research and technology development networks, the Sedna Centre will provide a resource for Aboriginal peoples, governments and industry, supporting environmental protection, response, regulation and decision-making. The Centre will establish and demonstrate Canadian leadership in the global challenge of protecting Arctic, ocean and coastal environments. Private sector investment of \$30M and a ten-year research commitment have been secured. A federal government investment of \$35 million is needed to green light this nationally and internationally important project.

Context: environment, economy and communities

Canada's ocean estate is immense: half of its 7,100,000 km² lies above 66°N, comprising one quarter of the Arctic Ocean; a further 1.2M km² lies in the harsh, cold North Atlantic. Canada is steward of the longest coastline (202,080 km) of any nation, touching three oceans: Arctic, Atlantic and Pacific. Under UNCLOS, our government exercises jurisdiction in its Arctic Exclusive Economic Zone to control, reduce and prevent marine pollution from vessels in ice-covered areas. Yet the **2014 Canadian Arctic Tanker Safety Expert Panel Review** found that *"Canada is not starting with mature preparedness and response models for dealing with (oil spill in ice) incidents."*

In the words of the **Royal Society of Canada Report on the Behaviour and Environmental Effects of Crude Oil Released in Aqueous Environments**, "Canada produces ~3M barrels of oil every day, importing hundreds of thousands of others, and all of it travels somewhere – accidents happen." Vessel fuels present as much environmental risk as oil in cargo, with greater statistical risk of release given the ratio of other seagoing vessels to oil tankers.

Marine transport remains the most economical way to transport bulk goods over long distances. Northern communities rely on sealift for re-supply of goods and materials needed throughout the year, as well as for fresh produce unavailable in the North. With Iqaluit's new deepwater port anticipated to open as early as 2020, increased traffic of larger vessels (including cruise ships) can be expected. Looking outward, the Northwest Passage is gradually opening, offering a long-sought route to bring Northern resources to market: the Northwest Passage offers reduced transit time between Europe and Asia, some 40% shorter than the Panama Canal route and 20% shorter than the Suez, saving time, fuel and CO₂ emissions (the latter by up to 1400 metric tonnes per trip). In 2014 the bulk carrier *MV Nunavik* transported a cargo of

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nickle ore unescorted through the Northwest Passage from Deception Bay, Nunavik to Bayuquan, China, bringing the Raglan Mine resource to a lucrative new market and achieving further fuel and GHG emissions savings.

As an additional consideration, Canada's hydrocarbon wealth has been stranded since discovery in the 1970s and 80s, but exploration investment is now increasing. Fourteen exploration licences were issued for the Beaufort Sea since 2012. To unlock the potential of those resources, options for environmentally responsible development must be explored. In order to protect traditional practices, food resources, northern economies and the fragile ecosystems on which all these depend, that effort must include development and testing of response technologies and processes, should spills occur. Understanding and developing effective, environmentally sound response technologies and practices for oil spills in ice will take many years. To be ready for development of our northern hydrocarbon resources when markets rebound, we must begin now.

Need

Most existing expertise on and research/test facilities for oil spill fate, effects and response applies to temperate regions. Focused research is needed to better understand how oil (and the chemical dispersants currently used in spill response) behave in cold oceans and in ice. Controlled testing is needed to assess the effectiveness – and effects – of response techniques in northern environments.

Our research community is responding. Laboratory-scale studies and simulations are generating a large volume of scientific knowledge. However, environmental approvals for field tests using oil in natural ice environments are (appropriately) rare. Therefore, large-scale tests in realistic, dynamic conditions are not possible and response training is done with oil proxies.

Over the past 50 years, industry, government agencies, and academic and independent research organizations – often in collaboration - have completed hundreds of scientific and analytical studies and conducted numerous laboratory and tank experiments. A small number of permitted field experiments have been conducted in Canada, the United States and northern Europe. Most recently, a 2006-2009 joint industry research project on oil in ice led by Norwegian RDI giant SINTEF conducted real-world tests to evaluate response tools for use in the Arctic.

Significant advances have been made in our ability to detect, contain and clean up oil spills in Arctic environments. Researchers continue to enhance oil spill response in all environments, including the Arctic. Arctic oil spill response research, however, is hindered because of the challenges of performing studies in representative conditions and the restrictions on Arctic field testing. There is no facility in the world that can realistically model an Arctic ocean environment.

Transforming scientific knowledge into solutions and capability requires a centre to coalesce existing expertise and bridge the gap between research and real-world application: a facility that can accurately

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reproduce cold ocean conditions (temperatures, winds, waves and ice), uses real oil, and is large enough to handle full-scale equipment. Additionally, in 2015 the Arctic Energy Summit, an Endorsed Project of the Arctic Council's Sustainable Development Working Group, concluded that "Internationally qualified and certified training centers are needed for equipment testing, harmonization of methodology, training of personnel, training for emergencies and oil spills, education, and communication."

Several countries are pursuing opportunities to build such a facility. Experts acknowledge that it *"will be built somewhere in the world. There will only be one, and that place will likely become the world leader in cold ocean oil spill research and response."* At present, the Sedna Centre is the only one with significant international private sector investment (~ 50% of capital cost) and long-term use commitment.

Project Origins

C-CORE is an ISO 9001:2008-registered not-for-profit Canadian RDI organization specializing in Ice Engineering, Geotechnical Engineering and Remote Sensing. For more than 40 years, we have performed contract R&D and provided science-based advisory services and technology solutions to mitigate operational risk in harsh environments and to address security, sustainability, safety and regulatory issues. C-CORE works with a network of national and international RDI partners and bridges the gap between academia and industry, ensuring that RDI efforts meet market needs.

Based on our record of success in large-scale, long-term R&D projects, C-CORE was engaged by the oil and gas industry to conduct a scoping study for an *Oil Spill Response Centre of Excellence* in Newfoundland and Labrador. The \$500,000 study outlines: infrastructure requirements and capital cost, organization and governance structures, operational considerations, staffing, location, synergies with existing organizations provincially, nationally and internationally, and the R&D program itself. The "cornerstone" of the Centre will be a facility unique in the world. Its estimated cost is \$65M. Private investment of \$30M has already been secured, as well as a 10-year research program commitment.

Sedna Centre: Canadian Innovation for the Polar World

The **Sedna Centre** will provide year-round capability to create real-world offshore conditions, from the calmest Pacific coast in summer to a wild North Atlantic storm, enabling controlled testing of technology and training of people to respond to oil spills in our oceans. The facility is designed to grow saline ice sheets and replicate all of Canada's ocean and coastline environments.

Its unique capabilities will complement current initiatives, enhance Canada's Arctic and ocean knowledge and technology capacity, and support marine habitat protection strategies. Further, the research program will provide opportunity for collaboration with a number of Canadian and international universities and research centres.

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The Sedna Centre conduct research in specific areas, particularly:

- remote detection of oil in challenging ocean conditions, as well as on, in and under snow and sea ice;
- spill behaviour and fate prediction;
- human factors under extreme conditions;
- well control and containment equipment; and
- oil recovery and coastline cleanup.

It will also provide response technology development and testing in priority areas, including mechanical recovery equipment; chemical herders, dispersants and sorbents; and *in situ* burning.

The training provided will create unique-in-the-world oil-in-ice response teams, through field response training with and without sea ice, and spill response command and control drills.

Partnering with Government on Economic Development, Environmental Protection and Innovation

The Government of Canada has made an unprecedented commitment, through the New Building Canada Plan, to invest \$53 billion over 10 years to foster economic growth and community wellbeing. Government has also made clear that it will do so in the context of strong environmental protection and support for the most vulnerable. Additionally, the Government of Canada has committed to investing \$200 million annually to create sector-specific strategies that support innovation clusters and clean technology. C-CORE offers an innovation-based solution to help fulfill these commitments across several industry sectors, particularly for northern and coastal communities.

The Sedna Centre will provide the infrastructure needed to demonstrate and improve Canada's ability to respond to oil spills in ice, which is a regulatory requirement for oil and gas development as well as a functional responsibility of the Department of Transport and the Canadian Coast Guard, but also needed for the social licence to develop the Arctic and establish deepwater ports.

It will help grow and diversify our economy by establishing a much-needed capability to draw international clients to Newfoundland & Labrador/Canada, leveraging existing facilities and expertise to generate a new innovation ecosystem for oil spill response. The Centre will provide specialized training, as well as research opportunities for students to complete graduate qualifications. It will provide direct employment in high-quality environmental science and engineering jobs, and foster indirect employment in the surrounding cluster, supporting our knowledge economy. Additionally, it will bring 500-1000 visitors annually to Newfoundland & Labrador for week-long spill response drills, providing induced business opportunity and employment in surrounding communities.

The Sedna Centre will be wholly dedicated to the protection of arctic and coastal environments, helping protect the traditional practices, food resources and economies of some of Canada's most vulnerable

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Aboriginal, rural and remote communities. It will provide means to develop evidence-based policy for northern development and provide state-of-the-art training to Canada's northern communities, enhancing their capacity for environmental protection.

C-CORE Recommendation for Budget 2016

Funding of \$35 million is required to build infrastructure that provides the means to demonstrate and improve technologies and processes to respond to oil spills in ice. Because no such facility exists in the world today, building it in Newfoundland and Labrador will demonstrate Canada's science, technology and policy leadership in the global challenge of Arctic and marine environmental protection, as well as create a new innovation ecosystem that attracts international business and inward investment. The Sedna Centre is a realistic infrastructure and economic development goal: the end-user need is demonstrated by a private sector commitment of a long-term use plan and \$30 million toward capital costs. C-CORE has a 40-year record of RDI program success and the stakeholder buy-in required to establish the Centre and execute its programs in collaboration with a network of national partners. The Sedna Centre aligns well with and can help deliver on the Government's commitments to economic development, innovation and environmental protection. Thank you for the opportunity to present this proposal to Finance Canada and we look forward to further discussions.

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