

A large cargo ship is shown on the left side of the image, with its deck stacked high with orange and white shipping containers. The ship's hull is white and extends into the water. In the foreground, a white drone with four rotors is flying over the water, positioned to the right of the ship. The water is a deep blue-grey color, and a long, narrow, reddish-brown oil spill containment boom is visible in the water, stretching across the middle ground. In the background, there are several sailboats on the water and a distant shoreline with trees and buildings under a clear sky. The overall scene is set during the day with bright, natural lighting.

OIL SPILL RESPONSE CHALLENGE

Applicant Guide:
Submitting Your Proposal



Government
of Canada

Gouvernement
du Canada

Canada



Natural Resources Canada & Impact Canada

This guide will help you determine if you are eligible to participate in the Oil Spill Response Challenge (herein referred to as “the Challenge”), funded by Natural Resources Canada (NRCan), and provide you with directions and explanations to assist you in completing an application at Stage 1 of either the Recovery or Detection Stream of the Oil Spill Response Challenge.

The Oil Spill Response Challenge is composed of two distinct streams (Recovery and Detection). This guide contains information pertinent to each stream. Each stream of the Challenge consists of three stages. Once selected, semi-finalists from Stage 1 will receive further reporting requirements and instructions for Stage 2.

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1

About the Oil Spill Response Challenge

As the world's fourth largest producer and exporter of oil, Canada is home to a vast network of pipelines and shipping systems to transport these resources to market safely and efficiently. In Canada, crude oil is transported between production areas, refineries, and export/import border points using pipelines, trucks, tanker ships and railways. In fact, [Canada has 840,000 kilometres of pipelines](#) that carry crude oil to domestic and U.S. refineries holding the capacity to transport 3.9 million barrels of oil per day.

Given the amount of oil product being moved through Canada on a daily basis, accidents can and do happen. This poses an inherent risk to the environment and surrounding communities, particularly to coastal and Indigenous communities.

While Canada has a world-leading marine safety system that ensures we can respond quickly to spills in Canadian waters, oil spills remain a risk. Even a small oil spill could have long lasting devastating effects on surrounding ecosystems, wildlife, and communities. It

is crucial to detect and respond quickly and effectively to reduce the impact of oil spilt in freshwater, marine, Arctic, and remote environments.

This Challenge supports the Canada Energy Regulator (CER)¹ recommendation under the [Reconsideration Report on the Trans Mountain Expansion \(TMX\)](#) that to minimize the amount of oil entering and harming marine and freshwater environments, and to expedite environmental recovery following a spill, Canada must avail itself of effective and rapidly deployable technologies that are suitable in diverse conditions.

Results achieved through the Challenge to advance oil spill detection and recovery solutions will substantively improve Canada's oil spill response capacity, helping to protect and preserve Canada's natural heritage and communities from the devastating impacts of oil spills.

The Oil Spill Response Challenge will spark new ideas and engage diverse perspectives to spur the development of innovative and rapidly deployable solutions that improve oil spill response in diverse Canadian aquatic environments.

1.1 Challenge Objectives

The Challenge aims to improve oil spill response in Canada by supporting solutions aimed at improving detection and recovery outcomes. This could mean enhanced performance of existing technologies or the development of new and innovative solutions that substantively improve oil spill response in Canadian aquatic environments, compared to conventional technologies. Collectively, these oil spill recovery and response solutions will enhance Canada's capacity for safe and effective oil spill response in freshwater and marine environments.

1 Formerly the National Energy Board (NEB)

The objectives of the Oil Spill Response Challenge are to:

- Mobilise innovators to spur the rapid development and deployment of new oil spill response technologies.
- Accelerate the development of rapidly deployable solutions that effectively detect oil spills and improve response times or that increase the oil spill recovery rate.
- Expand the suite of available oil spill response technologies for use in Canadian marine and freshwater environments

1.2 Challenge Streams

The Challenge is comprised of two **streams** that cover the critical areas of oil spill response: **detection** and **recovery**.

Detection Stream

The Detection Stream focuses on accelerating the development of innovative solutions that reduce the amount of time elapsed between the start of an oil spill in fresh and saltwater and the time in which it is detected, decreased, and/or eliminated. The type and accuracy of oil spill-related data being collected and aggregated to inform spill response is significantly expanded.

It covers all technologies involved in spill detection, data collection and analysis to inform timely and evidence-based decision-making during an oil spill emergency response. For the detection stream, solutions are expected to achieve at least one of the following results:

- Real-time detection of an oil spill in water
- Collect accurate **oil spill data** such as the spatial extent (breadth and depth) of the spill, estimate the magnitude of the release, the rate of release, and determine the composition of the spilled oil, and salinity of water (especially in estuarine environments), or a

combination of these capabilities

- Provide a **data analytics solution** to facilitate the aggregation, consolidation and analysis of data pertinent to an oil spill response such as weather data, oil spill data (as described above), emergency response crew location, etc.

Types of Solutions could include, but are not limited to, technologies such as surface (satellite, aircraft, glider, other remote sensing technologies, etc.) or subsurface (autonomous or manned underwater vehicles, etc.) detection, laboratory analytical methods transferrable to spill responders, AI, computer modelling, and data analytics products to aggregate data sets necessary to inform response during and after an oil spill.

Recovery Stream

The Recovery Stream focuses on the development and deployment of innovative solutions that increase and expedite the recovery of oil spilt into Canada's diverse aquatic environments. It covers the wide breadth of technologies designed to maximize oil recovery through methods such as containment, collection, treatment, or biodegradation.

Types of solutions could include, but are not limited to, innovative adaptations to conventional mechanical recovery technologies (e.g. skimmers, booms), and alternative response measures (e.g. chemical treatment, spill treating agents, herders, in-situ burning, surface washing agents, advanced sorbents).

Although solutions need to apply to salt and/or freshwater, innovators are encouraged to demonstrate the effectiveness of their technologies to the fullest extent possible using various oils (light, medium, heavy) and under various conditions under which an oil spill in Canada would typically be found (turbulent waters, immersed or sunken oil, ice or icy waters, remote locations).

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Applying to the Challenge

2.1 Eligible Applicants

Eligible applicants to the Challenge include the following:

- Businesses or other for-profit organizations
- Not-for-profit organizations
- Indigenous organizations and groups
- Post-secondary/academic institutions
- Individual or group of individuals
- International individuals and entities

Individual innovators or groups are encouraged to submit an application to the challenge, but in order to be eligible to receive funding, the project lead will be required to establish a Canadian legal entity (such as a company or a corporation or a not-for-profit organization) capable of entering into binding agreements in Canada.

International individuals and entities are encouraged to submit an application to the challenge, but in order to be eligible to receive funding, they will be required to establish a Canadian legal entity (such as a company, corporation, or non-for-profit organization) capable of entering into binding agreements in Canada. They may also be part of a partnership or consortium submitting a proposal as long as the applicant organization submitting the application meets the above criteria.

2.2 Fostering Collaboration

Innovators are encouraged to collaborate and reach across traditional collaboration spheres to connect with key players within the oil spill response sphere such as first responders, Indigenous organizations, regulators, testing facilities, oil spill scientists and engineers, industry and other innovators. It stands to reason that collaborations and partnerships with key players will help bolster applications and help maximize outcomes – especially as it pertains to expanding the performance and applicability of solutions within broader and more challenging oil spill and environmental contexts. Furthermore, applicants are encouraged to target gaps in oil spill technology to improve Canada’s emergency preparedness and better protect the environment. Throughout the evaluation process, preference will be given to projects that demonstrate strong collaborations and partnerships.

2.3 Eligible Solutions

Ideas and concepts can originate from anywhere in the world, but applicants will be required to demonstrate the ability to deploy their solutions in Canada.

In order to meet the eligibility requirements, solutions must be aimed at leveraging innovation to achieve specific outcomes tied to improving oil spill detection and recovery as identified in the following challenge statements:

Solutions that Improve Oil Spill Detection - Accelerate the development of innovative solutions that reduce the amount of time elapsed between the start of an oil spill in fresh and saltwater and the time in which it is detected, decreased, and/or eliminated. The type and accuracy of oil spill-related data being collected and aggregated to inform spill response is significantly expanded.

Solutions that Improve Oil Spill Recovery - Accelerate the development and deployment of innovative solutions that increase and expedite the recovery of oil spilt into Canada's diverse aquatic environments.

Solutions need to meet the objectives of the challenge statements as defined above. Solutions have to be scalable and applicable to end users (e.g., federal government regulators, oil spill responders, Indigenous oil spill responders, coastal communities, shippers and pipeline industry). Solutions that are limited to a specific end user (e.g., an organization developing a solution exclusively for their use rather than broad end user application) will not be acceptable. If you have started working on your solution prior to this challenge, you are still eligible to apply, but your application should consider and reflect how you can improve the effectiveness, competitiveness, and development of your solution.

As part of the challenge, activities implemented by participants could include, but are not limited to: development, prototyping, piloting and demonstrating solutions that support oil spill response. Projects should reflect partnership building, collaboration with end-users, capacity building, and other activities to support market readiness.

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Challenge Structure

3.1 Stages

The Challenge will follow a stage-gated approach wherein successful applicants will undergo an evaluation and selection process to access financial and non-financial incentives at each stage. The Challenge has three stages:

Stage 1: Proposed Concept – Approximately 3 months / 10 semi-finalists selected

During the first stage of the Challenge, all applicants will complete an online submission describing your concept. In the application, you will need to show an understanding of the problem you are trying to solve. It should include a proposed proof of concept for your solution design and clear explanation of how it meets the Challenge goals and assessment criteria.

Note: This guide will help you complete an application for Stage 1. Once selected, semi-finalists from Stage 1 will receive further reporting requirements and instructions for Stage 2. The following information is being provided to give you an idea of what will be required of you at Stage 2 and 3 of the challenge, should you be selected as a semi-finalist.

Stage 2: Incubation and Development of Prototypes – Approximately 10 months / 5 finalists selected

In this stage, 10 semi-finalists will be required to **design, build, and validate a prototype** of your solution, by executing your project plans and following an experimental method for testing and evaluating the effectiveness of your solution. Teams will be required to rigorously test and evaluate the effectiveness of their solutions by measuring and reporting against assessment criteria. Preferential consideration will be given to projects that have partnerships and collaborations with end-users to support future implementation.

At the end of this stage, teams should have achieved or exceeded Level 4 of the Technology Readiness Level Scale (see Annex A, page 30).

Stage 3: Early-stage Demonstration – Approximately 12 months / 1 winner selected

In this stage, the five finalist teams will be required to accelerate and **scale up prototypes to a level suitable for pilot testing or demonstration** at an appropriate testing facility, and demonstrate a strong business plan to bring your solution to market in an operational context. You will be required to report on the development of your solution, and rigorously test and evaluate the effectiveness of your solution by measuring and reporting against assessment criteria.

At the end of this stage, all finalists should have achieved or exceeded Level 6 of the Technology Readiness Scale, by testing their prototype in a simulated operational environment

or laboratory (see Annex A, page 30).

3.2 Prize Amounts

Up to \$10 million in total will be awarded to semi-finalists, finalists, and winner of the challenge.

Table 1: Structure and Prize Amounts

| Stage | Duration | Number of Winners | Prize Amount Per Winner |
|--|------------------------|----------------------|--------------------------|
| Stage 1: Proposed concept | Approximately 3 months | 10 semi-finalists | \$300K per semi-finalist |
| Stage 2: Incubation and Development of Prototypes | Approximately 8 months | 5 finalists | \$1M per finalist |
| Stage 3: Early Stage Demonstration | Approximately 1 year | 1 grand prize winner | \$2M per winner |

**The number and winners and prize amounts may vary depending on the applications received.*

Specific dates will be communicated through the challenge website at: impact.canada.ca

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Results and Assessment Process

4.1 Direct Results

The direct results of the Detection and Recovery streams are that solutions to significantly improve oil spill recovery advance to market. These solutions will be assessed based on different dimensions (e.g., level of innovativeness, effectiveness, usability) as measured by the assessment criteria.

4.2 Assessment Criteria

Solutions will be assessed against the following **six** criteria. Each of these criteria will be assessed at each stage of the challenge, with a different focus or weighting at each stage. At Stage 1, assessment will be based on the applicant's concept application (i.e., concept application submitted to the web portal). At Stages 2 and 3, additional information and data will be required for assessment, and these requirements will be communicated in time to

participants who reach these stages.

- **Effectiveness** – (*Detection Stream*) The amount of time elapsed between the start of an oil spill in fresh or saltwater and the time in which it is detected is significantly decreased, and/or eliminated. The type and accuracy of oil spill-related data being collected and aggregated to inform spill response is significantly expanded; OR (*Recovery Stream*) The amount of recovery of oil spilt into aquatic environments has increased through enhanced or expedited environmental recovery.
- **Applicability** - To develop a solution that can be applied within the environments and conditions present across Canada (e.g. operating environment, oil type, challenging conditions, scalability)
- **Environmental Sustainability** - Adverse impacts on the environment through the deployment of the oil spill technology are minimized.
- **Innovativeness** - The design approaches the problem of oil spill detection and/or recovery in an innovative way.
- **Usability** - Operational effectiveness and practicality of solution for end-users, including logistics and resource requirements to safely deploy the solution are realistic and feasible.
- **Market-Readiness** – Ability of innovators to bring their solution to market and scale their technology for deployment.

Table 2: Assessment Criteria at Different Stages

| Assessment Criteria | Stage 1 | Stage 2 and Stage 3 |
|---------------------------------|---|---|
| 1. Effectiveness | <p>Detection - Potential to decrease or eliminate detection time of an oil spill and/or improves accuracy of oil spill response through increased data accuracy (improved integration of data sets such as oil type, weather data, turbulence, salinity)</p> <p>Recovery - Potential to significantly improve and expedite recovery of oil spilt in water. This should include the anticipated percentage of oil recovered from the environment and projected recovery rate.</p> | <p>Detection – Rapid or real time detection of oil spills and/or improved information to support oil spill response.</p> <p>Recovery – Measurable and significant improvement in oil spill recovery and recovery rate in aqueous environments.</p> |
| 2. Applicability | <p>Detection – Anticipated Canadian environments and conditions that the solution addresses, with identification of: operating environment (e.g., source of spill – submerged pipelines, ships/tankers, railroads); detection capacity (e.g., volume and breadth of oil spill, types of oil spills); challenging geographic or weather conditions; and scalability.</p> <p>Recovery – Anticipated Canadian environments and conditions that the solution addresses, with identification of the operating environment (e.g., scenarios for oil recovery); recovery by oil type; and scalability)</p> | <p>Detection – Evidence of a scalable solution that can operate in targeted environments and conditions to support detection and response to oil spilt in water.</p> <p>Recovery – Evidence of a scalable solution that can operate on targeted oil types and in targeted conditions to recover oil spilt in water.</p> |
| 3. Environmental Sustainability | <p>Both – Potential environmental impacts of solution and mitigation approaches are identified. Should consider identification of potential chemicals released into the environment, air emissions, and impact on fisheries and wildlife.</p> | <p>Both - Measurement and assessment of potential environmental impacts of demonstrated solution.</p> |
| 4. Innovativeness | <p>Both - Novelty of proposed solution, added-value over existing solutions, transformative potential of solution. Development approach should consider improvement to conventional approaches and gaps addressed in current oil spill response regime.</p> | <p>Both - Innovation in solution is implementable and demonstrates improvement for oil spill responders and/or oil spill response regime.</p> |

| Assessment Criteria | Stage 1 | Stage 2 and Stage 3 |
|---------------------|--|---|
| 5. Usability | Both - Integration of user considerations and practicality to operationalize the solution concept, ensuring solutions are feasible, realistic, and safely deployable. Should consider logistical requirements for marine and/or freshwater environments, ability to use and deploy technology, human resource capacity, disposal and energy considerations. | Both - Evidence of solution that is operationally feasible and can be effectively used by target adopter group(s) to improve oil spill response. |
| 6. Market Readiness | Both - Plan to scale up the solution and bring it to market. Should consider how technology be used in Canada, intellectual property approach, existing or potential partnerships, engagement or plans to engage with end-users, approach to barriers (e.g., regulatory considerations), and scaling approach. | Both - Implementable commercialisation plan that includes partnerships and has engaged stakeholders, adopters, regulators, and investors. |

Further details on the information required from applicants to assess these criteria are outlined in the application form.

4.3 Selection Process

Natural Resources Canada will convene a review committee of public and private sector subject matter experts (e.g., representatives from the private sector, stakeholder groups, oil spill response regime experts) to assist in the assessment of applications. The review committee will review applications and provide recommendations to support Natural Resources Canada in determining the semi-finalists, finalists, and winners. Additional expertise from Natural Resources Canada and federal government expertise will support the review process.

Natural Resources Canada will take the necessary measures to avoid conflicts of interest for review committee members or others involved in the assessment process, and will execute non-disclosure agreements to protect applicants' information. Further to the review committee's recommendations, Natural Resources Canada will select and announce the

semi-finalists, finalists, and winners, as applicable to each stage of the challenge. All of Natural Resource Canada's decisions and selections will be final and not subject to appeal.

Please note that even if a solution meets all eligibility and assessment criteria, the submission of an application poses no obligation on the part of the Minister or of Natural Resources Canada officials to provide funding for the proposed project. The Minister retains discretion to determine whether an application will ultimately receive funding.

5

How to Apply

These application instructions apply to Stage 1 of the Detection and Recovery Streams of the Challenge.

Only applications submitted through the Impact Canada website via the designated Challenge application portal will be accepted. **Applications must be submitted through the portal no later than June 1, 2022 at 11:59 PM Pacific Time.**

Additional Challenge information, including process, timelines, specific deadlines, prizes and Frequently Asked Questions (FAQs), are available on the challenge website.

In order for an application to be considered for the Challenge, applicants **must complete and submit** the following documents online by the closing date and time indicated above on the challenge website.

A complete application package consists of:

Challenge Application Form:

1. Applicant Details (mandatory)
2. Proposed Solution Details (mandatory) and Supporting Material
 - Visual representations of the solution (mandatory)
 - Preliminary data or calculations (optional)
 - Existing articles of incorporation (optional)
 - Letters of recommendation (optional)
3. Declaration (mandatory)
4. Survey (optional)
5. If You Are Selected

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If You are Selected

6.1 Stages

Following recommendations from the challenge review committee up to 10 applicants will be selected in Stage 1 to be semi-finalists in the challenge. Semi-finalists will receive a two-phase prize amount including a grant and contribution agreement and will be invited to proceed into Stage 2 of the challenge. Semi-finalists should be committed to meeting the requirements of Stage 2 (Incubation and Development of Prototypes) which should involve recruitment of end-users to partner or collaborate on the solution development. Approximately 5 finalists will be selected to continue on to Stage 3 (Early Stage Demonstration) which will include testing of scaled prototypes in a simulated operating environment or laboratory.

6.2 Agreements

In order to receive the prize amount at each stage, each successful semi-finalist, finalist, and winner will be required to enter into a grant and/or contribution agreement with Natural Resources Canada.

Prior to entering into the agreement, all selected participants will undergo a due diligence process to confirm that they meet all the requirements to receive the Oil Spill Response Challenge funding and that they have the capacity to undertake the work outlined in their concept application. This includes legal, technical, and financial due diligence and may include, where applicable, the following documents:

- Documentary proof establishing that the lead applicant constitutes a **Canadian legal entity** capable of entering into legally binding agreements and may receive Oil Spill Response Challenge grant funding;
- Financial information, to support **financial risk assessment** including financial statements;
- For Quebec-based participants, documentation confirming **compliance with the Province of Quebec's M-30 legislation** prior to entering into an agreement with Natural Resources Canada.

The challenge may require applicants to submit a **project budget summary** to support expected project costs and **additional details on project plan** to support assessment of technology, regulatory, organizational, and environmental risks associated with the project.

6.3 Agreement Eligible Expenditures

Eligible expenditures must be directly related to, and necessary for, the implementation and conduct of a project and could include, but are not limited to:

- Salaries and benefits for personnel

- Professional, scientific, technical and contracting services
- Travel expenditures, including meals and accommodation, based on National Joint Council Rates
- Rent, leasing, maintenance costs and utilities
- Capital expenditures such as the purchase, installation, testing and commissioning of qualifying equipment, materials and products, including diagnostic and testing tools and instruments
- Other expenses including: Laboratory and field supplies, and materials
 - Printing services and translation
 - Data collection services, including processing, analysis and management
 - Administration and support services for the delivery of challenges
 - Facility costs for seminars, conference room rentals, etc.
 - Licence fees and permits
 - Field testing services
 - Training
- Overhead expenditures, up to 15% of the project costs, provided they are directly related to the conduct of the project and can be attributed to it, could include:
 - Administrative support provided directly to the project by the recipient's employee(s), valued on the same basis as professional staff time
 - Rent, routine building, laboratory and field equipment maintenance
 - Utilities such as heat, hydro, and office operating costs (e.g., faxes, telephone)
 - GST, PST or HST, net of any tax rebate to which the recipient is entitled

Exclusion: Federal contribution funds will not be used for the purchase of land.

6.4 M-30 Act (for Quebec)

The Province of Quebec's M-30 legislation can only apply to Quebec-based applicants. It is the Act Respecting the Ministère du Conseil exécutif (R.S.Q., c. M-30).

M-30 applies to various types of Quebec organizations; for example, organizations located in Quebec and receiving more than half of their financing from the Government of Quebec may be subject to the Act.

All Quebec-based organizations will have to address this matter and demonstrate their compliance with the Act during the project assessment process, and prior to entering into a grant agreement.

7

General Terms and Conditions

Applicants to the Challenge agree to the following when submitting their application:

- Applicants agree to comply with all applicable laws;
- Applicants must be able to demonstrate ownership of, or permission to use any intellectual property (IP) used in the challenge and provide necessary permission to NRCan for the purpose of administering this challenge;
- Applicants warrant that all information given in and with the challenge application form for this solution is, to the best of their knowledge, complete, true and accurate;
- Natural Resources Canada has the sole discretion to cancel this challenge or any part thereof at any time.

7.1 Unpaid Debts to the Government of Canada

A recipient of Natural Resources Canada funds must declare any amounts owing to the Government

of Canada. Any amounts due to the recipient under Natural Resources Canada programs may be set off against any such amounts owing to the Government of Canada under any agreement or any legislation with the Government of Canada.

7.2 Lobbying Activities

The applicant must ensure that any person lobbying on behalf of the applicant is registered and in compliance with the *Lobbying Act*. More information on the obligations in the *Lobbying Act* can be found on the website of the Commissioner of Lobbying of Canada.

7.3 Conflicts of Interest

Current or former public servants or public office holders are required to avoid conflict of interest situations while employed by the federal government and for a period of time following their service. The applicant acknowledges that any individuals who are subject to the provisions of the *Conflict of Interest Act*, the *Values and Ethics Code for the Public Sector*, the *Conflict of Interest Code for Members of the House of Commons*, any applicable federal values and ethics code or any applicable federal policy on conflict of interest and post-employment shall not derive any direct benefit resulting from this application unless the provision or receipt of such benefit is permitted in such legislation, policy or codes.

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Privacy



8.1 Use and/or Disclosure

The personal and/or business information in, accompanying and/or submitted in support of this application is being collected under the authority of the *Department of Natural Resources Act* and, by applying to the Challenge, Applicants agree that such information, may be used by NRCan, or disclosed to third parties including other Government Departments and members of the Review Committee, to:

- assess and review the eligibility of the Applicant and the Solution under the applicable NRCan program;
- verify the accuracy of the information provided in or with the application form and additional documents;
- assess the efficiency of the challenge model in furthering departmental priorities; and
- assess how well the initiative contributed to NRCan program objectives.

The Applicant consents that the information may also be used for the purposes of: contacting you should additional information be required; validating your credentials; signing a grant agreement; facilitating payment of the grant in the event your application is successful; program administration; and evaluation, reporting, and statistical analysis.

Personal information will be treated and disclosed in accordance with the *Privacy Act*. You have the right to access your personal information held by NRCan and to request changes to correct personal information by contacting NRCan [Access to Information and Privacy Protection Division](#).

Business information will be disclosed only in accordance with the provisions of the *Access to Information Act*. Information on the *Privacy Act* and the *Access to Information Act* is available at the following website: <http://laws.justice.gc.ca>.

8.2 Copyright permission

Natural Resources Canada may disclose, reproduce and distribute any part of or the whole of the documentation provided in or with the application form, within Natural Resources Canada and to its authorized third parties, including other government departments, for purposes consistent with the receipt, assessment and subsequent treatment of the application.

8.3 Intellectual property

Intellectual property created by a recipient will remain the property of the recipient.

Where it is to the advantage of Canadians, and not detrimental to the goals of the recipients, Natural Resources Canada may negotiate the shared use of intellectual property developed by recipients or through a third party. The rights to use this material may include further use of data for research purposes and/or publishing the intellectual property online, in printed documents and in publications.

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Contact Us

For any questions or clarifications regarding the Oil Spill Response Challenge, please contact the Natural Resources Canada Oil Spill Response Challenge team:

OilSpillChallenge-DefiDeDeversementDesHydrocarbures@NRCan-RNCan.gc.ca

Updates will be provided on [the challenge website](#), where applicants can review the FAQs and stay up-to-date with the latest Challenge news.

Applicants are encouraged to follow us on social media for the latest developments.

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Annex A: Technology Readiness Levels

Technology readiness levels (TRLs) are an indication of the maturity stage of development of particular technology on its way to being developed for a particular application or product. The table below provides a definition of Technology Readiness Levels 1 to 9.

TRL 1 – Basic principles of concept are observed and reported

Scientific research begins to be translated into applied research and development. Activities might include paper studies of a technology's basic properties.

TRL 2 – Technology concept and/or application formulated

Invention begins. Once basic principles are observed, practical applications can be invented. Activities are limited to analytic studies.

Applied research and development

TRL 3 – Analytical and experimental critical function and/or proof of concept

Active research and development is initiated. This includes analytical studies and/or laboratory studies. Activities might include components that are not yet integrated or representative.

TRL 4 – Component and/or validation in a laboratory environment

Basic technological components are integrated to establish that they will work together. Activities include integration of “ad hoc” hardware in the laboratory.

TRL 5 – Component and/or validation in a simulated environment

The basic technological components are integrated for testing in a simulated environment. Activities include laboratory integration of components.

Demonstration

TRL 6 – System/subsystem model or prototype demonstration in a simulated environment

A model or prototype that represents a near desired configuration. Activities include testing in a simulated operational environment or laboratory.

TRL 7 – Prototype ready for demonstration in an appropriate operational environment

Prototype at planned operational level and is ready for demonstration in an operational environment. Activities include prototype field testing.

Pre-commercial deployment

TRL 8 – Actual technology completed and qualified through tests and demonstrations

Technology has been proven to work in its final form and under expected conditions. Activities include developmental testing and evaluation of whether it will meet operational requirements.

TRL 9 – Actual technology proven through successful deployment in an operational setting

Actual application of the technology in its final form and under real-life conditions, such as those encountered in operational tests and evaluations. Activities include using the innovation under operational conditions.

Source: <https://www.ic.gc.ca/eic/site/080.nsf/eng/00002.html>