



Fisheries and Oceans  
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Coast Guard

Pêches et Océans  
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# CANADIAN COAST GUARD RESEARCH AND DEVELOPMENT PROGRAM

**PLAN 2009-2010**



Canada

April 2009



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### 17. Abstract

The Canadian Coast Guard Research and Development Plan lists those research projects planned for fiscal year 2009-2010 by the various branches and regions.

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**CCG R&D Program  
FY 2009-2010  
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## FOREWORD

A total of six on-going Canadian Coast Guard Research and Development Program (R&D) Projects are being funded this year for a total budget of \$358,000.

Any questions or suggestions regarding this publication should be directed to the Manager, Research and Development, (613) 998-1138.

PROJECT TITLE/ TITRE DE PROJET	TEC / CTP	Prior / Avant	09/10	Later/ Après
<b>ON-GOING PROJECTS/ PROJETS CONTINUE:</b>				
<b>QUÉBEC Region</b>				
			(in \$1000)	
Oil Dispersion in the Form of Oil-Mineral Aggregates in Ice-Encumbered Waters Dispersion des hydrocarbures sous la forme d'agrégats pétrole – argile dans des eaux encombrées de glace	483	422.5	<b>60</b>	0
Under Keel Clearance MODULE (A component of the Monitoring and Identification of Risks Integrated Tool (MIRIT) MODULE de dégagement sous quille (Une composante de l'outil intégré de surveillance et d'identification des risques (L'OISIR)	400	200	<b>45</b>	145
Four Season Lighted Spar Buoy Bouée lumineuse 4 saisons	1398	1193	<b>85</b>	70
<b>HQ-MNS</b>				
Accelerated Life Testing of Synthetic Moorings Étude de la dégradation accélérée d'amarres synthétiques	183	23	<b>83</b>	40
Continuation of Synthetic Mooring Residual Strength Field Trial Suivi et évaluation des amarres en service	21	11	<b>10</b>	
Ice Hazard Radar Radar pour les risques des glaces	250	100	<b>75</b>	75
<b>Total ONGOING</b>				
<b>Total CONTINUE</b>				
		1949.5	<b>358</b>	330

## LOOKING TO THE FUTURE

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The Coast Guard R&D Program is coordinated through one focal point to assist in the establishment of a master plan, support to the CG business plan and to facilitate the establishment of priorities, project selection criteria, performance measures, reporting and accounting.

The Commitment for 2009-2010 will focus on developing how we, as a SOA, may develop or evolve an integrated R&D strategy that emphasizes Innovation. This will compliment our new mission statement and help bring the CCG from a traditionalist/reactionary mini-r&d organization to one whereby its culture, management, and processes are established to foster innovation & the creation of new knowledge in the business we are in. This commitment is expected to lay the groundwork for enhanced framework conditions for research and innovation and the adapting of specific policies and supporting instruments to the changing nature of innovation.

<b>Commitment</b>		<b>Lead</b>
<b>2009-2010</b>		
Begin to develop a R&D strategy for CCG		DG, MS

The R&D Program will be re-evaluated and designed to meet the challenges of increased expectations regarding maritime safety, protection of marine and freshwater environments, and support to ocean development. The role of the program is to secure innovation investment that will allow CCG to fulfill its mandate more effectively and affordably in the delivery of critical services to all clients. The R&D program's mission is to develop knowledge essential to the achievement of those objectives.

With a view to improving linkages to the Business Planning process, the R&D Program assures continuing relevance of research activities to future operational plans and improving the degree to which good ideas are developed and communicated, for the benefit of all regions.

# CG R&D PROJECT DIRECTORY

## Oil Dispersion in the Form of Oil Mineral Aggregates in Ice-Encumbered Waters

During winter, the impact of an oil spill is all the more important that there exist no effective method of recovering spilled oil when water is encumbered with ice. The traditional mechanical oil recovery methods, deployed because there are no other alternatives, offer a poor performance in ice. As a result, at-sea recovery is very expensive and ineffective under these conditions. The present project was launched for the purpose of correcting this deficiency.

In 2009-2010, the project will be completed by issuing recommendations on the relevance of using a response method based on the OMA formation process. The principal element required to complete the project is a final report containing a summary of results from all the trials carried out since the project first began. The report will discuss the method's effectiveness in natural conditions, and where applicable will present guidelines for a response procedure to deal with oil spills in ice-covered waters.

Any response method based on the OMA formation technique will require an operational procedure that can be used by the people concerned. For the method to be operational, a user-friendly sediment injector will also have to be developed, so that sediment can be spread in measured quantities, depending on the volume and configuration of the spill, the required level of stir, the type and spread of the ice cover, and the intensity and direction of the wind. The type of ice-breaker used and its ability to provide the necessary level of stir must also be considered. The tool must be designed to limit the risks of oil sedimentation.

<b>Project Director:</b>	Martin Blouin, Québec Region
<b>Project Leader:</b>	Stéphane Dumont, Eng., Québec Region
<b>CG Branch:</b>	Environmental Response
<b>Funding:</b>	CCG R&D Program TEC \$482,500 (Investment to date \$422,500)
	<u>09/10 Delegation</u> <u>\$ 60,000</u>
<b>Schedule:</b>	2001-2002 to 2009-2010
<b>Project Number:</b>	FJMP3

## Under Keel Clearance MODULE (A component of the Monitoring & Identification of Risks Integrated Tool (MIRIT))

The loading capacity and safety of ships travelling the St. Lawrence is directly related to three factors: the maintained (dredged) depth of the channel with respect to the chart datum; (2) the water level with respect to the chart datum; and (3) the various dynamic factors and phenomena that are included in the underkeel clearance calculation (squat, roll, pitch, etc).

The present under-keel clearance (UKC) standard was introduced in 1992 and is managed and applied by the Marine Communications and Traffic Services (MCTS). A review of the UKC standard is now necessary, as a result of the recent squat study conducted by the CCG and the latest developments of the Water Levels Prediction and Interpolation System (SPINE). The commercial shipping squat study led to the conclusion that the UKC management tools currently used by CCG had significant limitations. Squat values measured for 12 merchant vessels transiting the St-Lawrence Waterway indicate that such tools are not sufficiently precise to ensure effective and optimal management of traffic in the waterway. More precise tools must be developed following the squat study ending in March 2007.

The UKC Module is one of the components of the *Monitoring and Identification of Risks Integrated Tool (MIRIT)* that the CCG-QR proposes to develop and implement in the upcoming years. The MIRIT is part of a greater concept of Integrated Navigation with the second stage including the following activities:

1. Development of a stream interpolation method
2. Validation of the method selected with measurements in the field
3. Assessing uncertainties related to the parameters used for UKC calculation.

**Project Director:** Pierre Rouleau, eng./François A. Boulanger, Quebec  
**Project Leader:** Stéphane Dumont, Eng., Quebec Region  
**CG Branch:** Marine Communications and Traffic Services (MCTS)

**Funding:** TEC \$260,000  
09/10 Delegation \$ 45,000

**Schedule:** 2007/2008 – 2011/2012

**Project Number:** FMCF3

## Four Season Lighted Spar Buoy

Every year, the Quebec Region faces pressure from the marine industry to leave the lighted buoys in place as long as possible in the fall and to put them back as soon as possible in the spring. Furthermore, the requirement to go to the same place twice a year to change the spar buoy for the lighted one (and the reverse) involves considerable CCG resources.

Based on the findings, the project objectives have been modified and the project is now focused on providing the necessary technical information to install 0.7m and 1m luminous spar buoys that can provide reliable and efficient service 9 months of the year, remain in the water year round, and stay in place up to two years without replacement or maintenance.

2009-10 will see the finalization of the design for a steel four-season buoy for the reach between Grondines and Pointe du Débarquement and the creation of production plans for two buoy models.

A report on the performance of the four-season buoys in Lac Saint-Louis and the Canal de la Rive Sud will be produced in 2009-2010.

<b>Project Director :</b>	Daniel Lefebvre, Québec Region	
<b>Project Officer :</b>	Georges Cossette, Eng.	
<b>CG Branch:</b>	Navigation Services	
<b>Funding:</b>	TEC	\$1,227,400
	<u>09/10 Delegation</u>	<u>\$85,000</u>
<b>Schedule:</b>	2000/2001 – 2010/2011	
<b>Project Number:</b>	FJNF3	



## Accelerated Life Testing of Synthetic Moorings

Synthetic moorings have been deployed as a replacement for chain mooring and are seen as a major cost saver for CCG floating aids to navigation. SM knowledge to date is based on anecdotal information, and limited research. Further progress on the use of and anticipated benefits of SM is limited by the lack of documentation related to the in service use and residual strength of synthetic moorings in CCG's floating aids programs. This research is essential in order to fully benefit from the potential extended service life of synthetic moorings.

Accelerated life testing of synthetic moorings in a controlled laboratory setting is anticipated to be an efficient way to mimic actual long term in-service degradation, rather than waiting and tracking in-service ropes over many years. Based on preliminary investigations and follow-on detailed test planning, it is envisaged that a number of ropes will be subjected to a combination of environmental parameters (i.e. salt, heat, UV) and cyclical stresses mimicking upwards of 15 years of operational service within a minimal timeframe. This phase of the project is intended to perform the accelerated life testing of synthetic moorings in accordance with the defined test plan. The expected results of the test program are:

- the correlation of field trial residual strength test measurements with laboratory accelerated life test results; and
- additional knowledge supporting the establishment of synthetic mooring end-of-life retirement criteria/parameters with respect to usage.

This program will concentrate on ropes for small and medium sized anchors (<2,500lbs). The proposed work is expected to span two fiscal years due to the nature of the cyclic aging tests.

<b>Project Director:</b>	Lynn Denis, A/Manager Aids to Navigation	
<b>Project Officer:</b>	Garret Furlong, Integrated Technical Services	
<b>Funding:</b>	TEC	\$183,000
	<u>09-10 Delegation</u>	<u>\$83,000</u>
<b>Schedule:</b>	2005-2006 – 2010-2011	
<b>Project Number:</b>	FKAD6 (ITS); FQAP6 (MNS)	

## Continuation of Synthetic Mooring Residual Strength Field Trial

Considerable anecdotal information has been gained through several years of synthetic mooring use. However, specific issues related to the in service use and residual strength of synthetic moorings require further investigation to ensure the best implementation of synthetic moorings in the Canadian Coast Guard's (CCG) floating aids to navigation program.

The initial outcome of this research will be the population of a family of data curves expected to link in-service usage to the residual break strength, or lift capacity, of synthetic moorings. This research will lead to the eventual development of a comprehensive synthetic mooring design and fabrication guide which will address different configuration options and their applicability to different buoy sizes, water depths, and environmental conditions. The proposed research and development will contribute to the necessary body of knowledge to achieve the above outcomes.

**Project Director:** Lynn Denis, A/Manager Aids to Navigation  
**Project Officer:** Garret Furlong Integrated Technical Services

**Funding:** TEC & 09/10 Delegation \$10,000  
**Schedule:** 2009-2010  
**Project Number:** FKAD6 (ITS); FQAP6 (MNS)

## Ice Hazard Radar

This inter-deptal project has been ongoing outside the R&D Program. Phase two will be the acquisition, modification and installation of the additional hardware leading to the demonstration of the system in 2008/09, subsequent improvements and a validation trial in 2009/10.

**Phase two** will be the demonstration of the system in 2009, subsequent improvements and a validation trial in 2010.

During the summer of 2009 or 2010, the Ice Hazard Radar will be evaluated in conjunction with satellite imagery, data obtained from the Helicopter Ice Sensor (BIO), NRC Video System, and CIS ground-truthing. A large volume of radar data will be recorded for later analysis. The radar data will be recorded from various ice types and objects, in various states of melt, wetness or cover, and in various environmental conditions. The recorded data will be analyzed to characterize the detection performance of the X-Polarized radar, and its ability to discriminate effectively between first year ice and multi-year ice environment.

**Project Director:** Barbara O'Connell, Ottawa  
**Project Officer:** Jose Fernando Mojica, ITS, Ottawa  
**CG Branch:** Icebreaking Program

**Funding:** TEC \$250,000  
09/10 Delegation \$ 75,000

**Schedule:** 2008-2009 – 2010-11

**Project Number:** FVGV6

## ***NEW SEARCH AND RESCUE INITIATIVES FUND (NIF)***

The New Search and Rescue Initiatives Fund (NIF) is a unique undertaking by federal and participating provincial, municipal and private Search and Rescue (SAR) organizations. The objective is the saving of lives by enhancing SAR prevention and the provision of SAR services. NIF is not specifically oriented to R&D projects but, rather, was established by the federal government to provide funding to new initiatives which enhance the effectiveness of SAR by all participants, especially those outside government.

NIF is managed by the National Search and Rescue Secretariat (NSS) reporting to the Lead Minister for Search and Rescue (the Minister of National Defence).

Within CCG, it is managed as a separate program within the Safety and Environmental Response Directorate (SERS). For the CCG R&D Program, NIF funded research projects are reported when a research project is sponsored by CCG.

Below lists the ongoing project funded by NIF for FY 2009/2010. New proposals were not yet approved at the time of this publication and will therefore, be included in the year-end annual report.

To obtain more information about these projects, please contact Janice Brasier at (613) 991-6123, CCG NIF Coordinator.

### **Project List Summary**

	<b><i>Project Name / Recipient/Region</i></b>	<b><i>ID / # / Code</i></b>	<b><i>Summary</i></b>	<b><i>Cost</i></b>								
1	<i>Self-Locating Data Marker Buoy w/Iridium Satellite Telemetry</i>	<i>2007010 DFO 3/08 MSS67</i>	<i>This project is under contract with C-Core to develop an Iridium Based Self Locating Data Marker Buoy in reduced size (smaller than or equal to "A" size) package designed for vessel and air deployment. This design will incorporate IRIDIUM short burst data telemetry capability; developed to meet or exceed the reliability of the current ARGOS based design while improving upon the manufacturing cost.</i>	<table> <tr> <td><i>08/09</i></td> <td><i>93,000</i></td> </tr> <tr> <td><i>09/10</i></td> <td><i>564,351</i></td> </tr> <tr> <td><i>10/11</i></td> <td><i>234,987</i></td> </tr> <tr> <td><i>TEC</i></td> <td><i>892,338</i></td> </tr> </table>	<i>08/09</i>	<i>93,000</i>	<i>09/10</i>	<i>564,351</i>	<i>10/11</i>	<i>234,987</i>	<i>TEC</i>	<i>892,338</i>
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