

Operating in the Arctic Ocean: Environmental Realities and Technical Challenges

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Arctic Ocean Technology: Utilizing R&D to Overcome Resource Development Challenges

<http://www.restco.ca/Northern%20Lights%2023b%20Jan%202012%20presentation%20ADAMS%20-%20Session%20III%20Final.pdf>

Explanatory Footnote:

This SUBMISSION to EAC is a 5 page supplement to RESTCo's 27 pp presentation (with 42 pictures/diagrams) The key points are summarised in pages 1,2,3 – Introduction, RD&D requirements, and Conclusions. Key references are given in pages 4,5 - in order to provide the necessary context for such a big subject.

INTRODUCTION

This presentation is being provided by a new company called RESTCO which is focused on remote community sustainability starting with energy security but including the necessary local social and community development needed to create healthy and long term solutions. RESTCO publishes monthly a web newsletter called “Spill Monitor”. Check our website for more information.

The presentation will be divided into three parts: **first**, some background on R&D in the Arctic related to oil and gas development that sets the scene where these activities are to be undertaken followed by a short account of the current process to regulate the oil and gas industry in the Canadian Arctic; **second**, a review of oil industry practices and technologies with regard to offshore drilling/spill cleanup capabilities especially in the Arctic; and **third**, some considerations about possible R&D directions for safer and lower risk offshore drilling in the Arctic.

The **conclusions** are presented in the form of some recommendations for how best to approach oil spill remediation in the Arctic Ocean. It will become clear from this presentation that industry does not possess the means to cleanup oil spills in ice covered waters at this time. It is therefore essential that R&D be undertaken before such industrial activities begin in earnest. In some countries oil exploration in the Arctic is already underway which places the whole Arctic Ocean in danger due to the lack of suitable technology for dealing with spills. The paper ends with a **reference section** that covers the subject of oil spill cleanup technology and background information about the impact of oil spills.

In fact even under Soviet rule in the 1970s, the scientists in Russia were well aware of this risk. In a paper (1) from 1976 by Acad. A. F. Treshnikov, Director of the Arctic and Antarctic Institute in what was then Leningrad, he concluded with the following:

“In Alaska and other northern areas where extensive oil development has been started, there exists a real threat that the arctic environment could change as a result of oil spillage. Conceivably, part of the recovered oil could spill over water and ice to become incorporated into the gyral over the Canadian Basin, where it might accumulate for many years.”

Part 1 - A glimpse of R&D done in the Beaufort Sea 30 years ago, and the National Energy Board report on Offshore Drilling in the Arctic Ocean

FIGURES 1 and 2 - Summary reports of the Beaufort Sea Project (2)

These Figures are the covers of summary books indicating that early in the oil and gas industrial development in the Canadian Arctic in the mid-1970s, a major study took place called the Beaufort Sea Project. It was in today's dollars approximately a \$50 million dollar multi-disciplinary study funded by the Federal Government and Industry. Some 45 technical reports were completed and five summary books published. This is basic information related to the environment where industrial development was underway in the 1970s and is again being planned. RESTCO has made these very important reports that were out of print available on our web site. We have also suggested that all the technical reports be put on-line and this is being done by Fisheries and Oceans Canada from their Victoria location.

Part 2 - Looking at current technology proposed for cleanup of oil spills in the ice covered Arctic Ocean – OR – Can anyone clean up an Arctic oil spill?

When you review current industry capability for maritime oil spill cleanup and put it into an Arctic scenario, the situation does not look encouraging.

FIGURE 17 Drill ships in the Arctic - This picture illustrates the impact on the native culture of industrialization in the Arctic. Note enormous difference in scale between the industrial activities and the hunter.

RD&D REQUIREMENTS

Part 3 - What are RD&D requirements (especially the final D for demonstration) leading to safe and low risk drilling off-shore in the Arctic?

From our review of oil spill cleanup technology, it is clear that considerable improvements must be made and could be achieved related to actual methods of removing the oil from the environment after a spill and in the logistics and management of the cleanup effort. One of the key points is to have adequate equipment and trained people readily available to act quickly when the spill is first detected. In order to accomplish this in the Arctic, there will have to be serious and well funded R&D accompanied by demonstrations and tests of the approach with actual oil spills similar to the ones earlier described in the Beaufort Sea Project in the 1970s. The lack of real tests in the environment due to concerns with damage to the areas where the tests are conducted should be weighed against the prospects of the enormous risk of assuming that field tests with stimulant oils or virtual simulation tests will reflect the real situation.

Finally, the equipment must be positioned close to the probable location of Arctic oil spills and the closest local population trained to respond and kept prepared by regular training exercises. Backup workers and equipment must also be available within a day or so. Equipment and workers could be delivered by air from a central Arctic location where significant cleanup equipment could be kept in readiness.

Canada is currently boosting its Arctic research capabilities and the Department of National Defence is also enhancing Arctic capabilities and improving Arctic infrastructure; both are initiatives which could be harnessed to improve Arctic oil spill response capabilities.

FIGURE 42 A new Canadian approach to oil spill cleanup

Figure 43 Gravity separation method of oil recovery in EST oil cleanup vessels

FIGURES 44 Proposed Polar class oil cleanup vessel

The figures above show a Canadian oil spill cleanup technology which is being tested by the Canadian Coast Guard. The company, Extreme Spill Technology Inc. (8), has currently some smaller vessels being built in China. The method of oil removal from the water is simple and effective compared to other skimmer designs and waves would be less of a problem for this type of skimmer. Tests are needed in ice covered waters to see what designs would best operate in the Arctic. Ice breaking capacity would also be required in most cases when an ice cover is present at the time of the spill and vessels capable of transporting the collected oil and water would be required.

There are also new materials that can be used to coagulate and render non-toxic spilled oil which are now being marketed in Canada. For example the products of the company Spill Green Inc. which demonstrated the cleanup capability of their material with used motor oil in an ice water mixture at the RESTCO Forum held in Ottawa in September (9).

CONCLUSIONS

There are four recommendations:

1. A quick response to avoid the oil becoming widely dispersed and impossible to collect which is critical if the spill occurs under moving ice. Logistics issues are key to successful spill remediation in the Arctic where pre-positioning of spill cleanup assets is a necessity.
2. New technology is required and a potential effective skimmer is being tested and more ice coping effective approaches are needed with field testing part of the process.
3. Do not burn the oil due to the impact of soot and do not use dispersants which are toxic themselves and can transfer the oil from the surface where it could be collected and into other regions of the water column or to the bottom with serious and at present uncertain consequences.
4. Use non-toxic coagulants for smaller spills such as the product Spill Green (see www.spillgreen.com)

REFERENCES

1. A. F. Treshnikov, Chapter 6 in “Assessment of the Arctic Marine Environment: Selected Topics”, Institute of Marine Science, Univ. of Alaska, Fairbanks (1976).
2. Beaufort Sea Project Summary Report reprints see http://www.restco.ca/BSP_Reprints.shtml
3. National Energy Board Reports on the Review of Offshore Drilling in the Arctic see <http://www.neb-one.gc.ca/fetch.asp?language=E&ID=A37753>
4. See <http://www.cbc.ca/news/business/story/2011/09/12/north-national-energy-board-roundtable-offshore-oil.html>
5. ITOPF Handbook 2011/12 see www.itopf.com for information and to request a copy. ITOPF also is a source of many technical publications related to oil spills.
6. For an excellent review of the 1989 Exxon Valdez oil spill see http://www.eoearth.org/article/Exxon_Valdez_oil_spill taken from the Encyclopedia of Earth first published (2010).
7. SL Ross Report to the National Energy Board, “Spill response gap study for the Canadian Beaufort Sea and the Canadian Davis Strait”. July 12, (2011).
8. Extreme Spill Technology see www.spilltechnology.com
9. For Spill Green product information see www.spillgreen.com and for the test of the product see http://www.restco.ca/Inuvik_RT_Ottawa_Presentations.shtml for the Spill Green presentation on Sept 13, 2011.

Documents Referenced in the Advance Questions Submission to the NEB by RESTCO and of general value in oil spill remediation follow:

[The ITOPF 2011 handbook](#) (PDF 3.3 MB) (54 pp)

[The Macondo Blowout Environmental Report](#) January 2011 (PDF 2.5 MB) (9 pp)

[The Captain Mark Turner report on Newfoundland Labrador offshore oil spill prevention and response capabilities](#) December 2010 (PDF 4 MB) (273 pp)

[The SL Ross Report - Spill Response Gap Study for the Canadian Beaufort Sea and the Canadian Beaufort Sea and Davis Strait](#) July 2011 (PDF 111 KB) (37 pp)

The PEW report - Oil Spill Prevention and Response in the U.S. Arctic Ocean: Unexamined Risks, Unacceptable Consequences

[Summary](#) November 2010 (HTML)

[Full Report](#) November 2010 (PDF 7.9 MB) (146 pp)

SUBMISSION to EAC - Environmental Audit Committee of UK House of Commons - Protecting the Arctic

[The NUKA report - Oil Spill Response Mechanical Recovery Systems for Ice Infested Waters: Examination of Technologies for the Alaska Beaufort Sea.](#) June 2007 (PDF 2.7 MB) (100 pp)

[The WWF report "Lessons not learned: 20 Years after the Exxon Valdez Disaster - Little Has Changed in How We Respond to Oil Spills in the Arctic"](#) Feb 2009 (PDF 1.1 MB) (16 pp)

[COSTCO BUSAN Oil Spill in San Francisco Bay](#) November 2007 (video 1 minute)

[Alaskan oil boom 2000 tests "What If An Oil Spill Happened in the Arctic?"](#) July 2011 (video 2 minutes)

[The 26 minute video video recapping BP's Gulf Gusher's effects](#) August 2011 (HTML & video)

Additional Background Documents

[The Beaufort Sea Project Reports](#)

[Western Arctic Oil Spill Response Gaps - World Wildlife Fund Canada - March 2011 \(PDF 1.8 MB\) \(28 pp\)](#)

[CBC Doc Zone - Blowout - Is Canada Next.2010.12.09](#) (video) 44 minutes

[Overview of Historical Canadian Beaufort Sea Information - February 2009 \(PDF 2.5 MB\) \(99 pp\)](#)

[History of petroleum industry in Canada \(PDF 1.7 MB\) \(14 pp\)](#)

[LAB EXERCISE: 3 Spill Tools: An Oil Spill Response Exercise](#)

<http://www.eoearth.org/resources/view/166779/?topic=50365>

To evaluate three approaches - dispersant - burning – skimmers

Getting Spill Tools - Each Spill Tool can be downloaded from the Web at

<http://response.restoration.noaa.gov/spilltools>

For additional information: <http://response.restoration.noaa.gov>

orr.spilltools@noaa.gov - (206) 526-6317

North Slope Borough Oil Spill Mitigation, a paper by Extreme Spill Technology Inc., see www.spilltechnology.com to download a copy.

RESTCO's February 2, 2012 paper is headlined on the RESTCo home page with a link:

<http://www.restco.ca/Northern%20Lights%2023b%20Jan%202012%20presentation%20ADAMS%20-%20Session%20III%20Final.pdf>

NOTE - We are pleased to report that our request to the Department of Fisheries and Oceans has resulted in the scanning of the original technical papers and having them made available online. With their permission, we are posting copies here on the RESTCo website, and we are also providing links to to the DFO library versions. We hope you will find the information in these documents to be of interest and value in learning more about the arctic ocean biosphere and the effects of oil upon it.