

The Honourable Gary Lunn, P.C., M.P.
Natural Resources Canada
House of Commons
Ottawa, Ontario
K1A 0A6

The Honourable Jim Prentice, P.C., M.P.
Indian Affairs and Northern Development
House of Commons
Ottawa, Ontario
K1A 0A6

Dear Ministers:

On behalf of the Environmental Studies Research Funds Management Board, it is my pleasure to submit the 2005 Annual Report for the Environmental Studies Research Funds in accordance with the *Canada Petroleum Resources Act*, paragraph 79(1)d.

Sincerely yours,

Bonnie J. Gray Wallace
Chair
Environmental Studies Research Funds
Management Board

ENVIRONMENTAL STUDIES RESEARCH FUNDS

ANNUAL REPORT

2005

FEBRUARY 2006

Environmental Studies Research Funds Profile

The Environmental Studies Research Funds (ESRF) sponsor environmental and social studies designed to assist government decision-making related to oil and gas exploration and development on Canada's frontier lands. The ESRF program, initiated in 1983 under the *Canada Oil and Gas Act (COGA)*, now receives its legislated mandate through the superseding legislation, the *Canada Petroleum Resources Act (CPRA)* proclaimed in February 1987. Funding for the ESRF is provided by industry through levies on exploration and production properties on frontier lands. The ESRF is directed by a joint government / industry / public Management Board and is administered by a secretariat which resides within the National Energy Board in Calgary, Alberta.

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Background on the Structure and Operation of the Funds

The Environmental Studies Research Funds (ESRF) finance environmental and social studies pertaining to the manner in which, and to the terms and conditions under which, petroleum exploration, development and production activities on frontier lands should be conducted. Section 101(1) of the *Canada Petroleum Resources Act (CPRA)* defines an environmental study as “A work pertaining to the measurement or statistical evaluation of the physical, chemical, and biological elements of the lands, oceans, or coastal zones, including winds, waves, tides, currents, precipitation, ice cover and movement, icebergs, pollution effects, flora and fauna, both onshore and offshore, human activity and habitation, and any related matter.”

The Environmental Studies Research Funds (ESRF) are directed by a twelve-member Management Board which has representation from the federal government, the regional petroleum boards, the oil and gas industry, and the general public. Bonnie J. Gray Wallace, Professional Leader-Northern Strategies of the National Energy Board, is the current chairperson of the ESRF Management Board.

The ESRF Management Board directs the business of the ESRF, sets priorities for study topics, determines the program budget, and facilitates the development of study proposals on behalf of the Minister of Natural Resources Canada and the Minister of Indian Affairs and Northern Development.

The program operates on a calendar year basis. The Board generally meets quarterly; however, the frequency of meetings is adjusted as circumstances dictate. The Board assesses the information requirements of government and industry to determine priorities for the study program for the coming year. The budget to support the study program and its administration forms the basis for the calculation of the levy rate schedule. The budget and levy rates are submitted to the Ministers for approval by November 1 of each year. The projects under the study program are initiated following the collection of the levies that generally occurs in the first quarter of the calendar year.

Activities in 2005

The ESRF undertook an ambitious program of activity for 2005, meeting three times during the year. The total value of the 2005 program was \$1,770,000, which included a \$250,000 operational budget for administration and management of the ongoing study program.

A total of \$768,636 in funding was raised for the 2005 studies and administration program through Levy #17 (refer to Table 1). This levy covered the new study program, the administration budget, and the continued funding of ongoing studies. The difference in the total amount levied and the program value was the result of a land sale after the calculation of the levy and prior to the issuance of invoices. Excess funds raised in these circumstances are credited against future years' levies. The collection of unpaid levies is being pursued by the Management Board.

TABLE 1
ESRF LEVY #17

REGION	LEVY #17 \$/ha 2005	TOTAL LEVIES INVOICED 2005	TOTAL LEVIES COLLECTED 2005	BACK LEVIES COLLECTED 2005	TOTAL REVENUES COLLECTED 2005
1 Queen Charlottes North	\$0.0000				
2 Hecate Strait	\$0.0000				
3 Queen Charlottes South	\$0.0000				
4 Vancouver Island	\$0.0000				
5 Labrador North	\$0.0000				
6 Labrador Central	\$0.0000				
7 Labrador South	\$0.0000				
8 Northeast Newfoundland	\$0.0715	\$198.27	\$198.27		\$198.27
9 Newfoundland Slope	\$0.0154	\$37,346.74	\$37,346.74		\$37,346.74
10 Grand Banks North	\$0.1103	\$105,367.16	\$104,938.87	\$10,374.55	\$105,976.42
11 Grand Banks South	\$0.0013	\$5,189.90	\$5,189.90		\$5,189.90
12 Scotian Shelf East	\$0.0662	\$123,028.07	\$79,637.81		\$79,637.81
13 Scotian Shelf West	\$0.0867	\$25,910.30	\$15,346.77		\$15,346.77
14 Scotian Shelf	\$0.0358	\$84,923.83	\$70,521.13		\$70,521.13
15 Gulf of St. Lawrence	\$0.0879	\$60,152.52	\$31,469.87	\$46,356.53	\$77,826.40
16 Hudson Bay	\$0.0000				
17 Beaufort South	\$0.3286	\$202,271.37	\$199,780.26		\$199,780.26
18 Beaufort North	\$0.2833	\$8,521.66	\$8,521.66		\$8,521.66
19 Western Archipelago-Offshore	\$0.0141	\$105.31	\$105.31		\$105.31
20 Central Archipelago-Offshore	\$0.0140	\$3,371.86	\$3,371.86		\$3,371.86
21 Eastern Archipelago-Offshore	\$0.0000				
22 Baffin Bay	\$0.0000				
23 Yukon North	\$0.0000				
24 Yukon South	\$0.0000				
25 Mackenzie Delta	\$0.0602	\$33,647.41	\$23,262.30		\$23,262.30
26 Mackenzie North	\$0.0587	\$46,556.50	\$34,382.12		\$34,382.12
27 Mackenzie Central	\$0.0512	\$16,403.53	\$16,525.34		\$16,525.34
28 Mackenzie South	\$0.0627	\$12,679.44	\$9,389.20		\$9,389.20
29 Western Archipelago-Onshore	\$0.0606	\$96.66	\$0.00		\$0.00
30 Central Archipelago-Onshore	\$0.0600	\$2,862.90	\$2,862.90		\$2,862.90
31 Eastern Archipelago-Onshore	\$0.0000				
TOTAL		\$768,636.42	\$642,850.30	\$56,731.08	\$699,581.38

2005 Study Program

Recent Publications

In 2005, ESRF published or prepared for publication the following reports¹ in the ESRF Technical Report Series.

- #152 Ellis & Associates Inc. *Drilling Waste Management – Recommended Best Practices.*
- #153 KAVIK-AXYS Inc. in association with FMA Heritage Resources Consultants Inc. *Traditional Knowledge Manual Volume 1: Literature Review and Evaluation & Traditional Knowledge Manual Volume 2: Using Traditional Knowledge in Impact Assessments.*
- #154 AMEC Earth & Environmental. *Inuvialuit Settlement Region Drilling Waste Disposal Sumps Study.*
- #155 Dillon Consulting Limited and Salmo Consulting Inc. *Beaufort-Delta Cumulative Effects Project.*
- #156 Moulton, V.D., and B.D. Mactavish. *Recommended Seabird and Marine Mammal Observational Protocols for Atlantic Canada.*
- #157 Gary Sonnichsen, Thian Hundert, Robert Myers, Patricia Pocklington. *Documentation of Recent Grand Bank Iceberg Grounding Events and Comparison with Older Events of Known Age.*

Results of several studies to which ESRF contributed have or will soon be published in the other report series, including:

Song, J., A. Mathieu, R. F. Soper, and A. N. Popper. *Structure of the inner ear of bluefin tuna (Thunnus thynnus).* J. Fish. Biol. (in press).

Environment Canada. *Air-shed Monitoring on Sable Island – Annual summary reports* (beginning in March 2006).

¹ Complete citations appear in the list of published reports at the end of this annual report.

Ongoing Studies in 2005

The following studies continued through 2005.

- **Data Collection Optimization** – East Coast. Coastal Oceans & Associates Ltd has been contracted to carry out a study and convene a workshop to investigate the use and effectiveness of regional physical environment monitoring of waves and currents, as an alternative to installation-specific monitoring of physical environmental parameters that is currently undertaken by individual offshore operators.
- **Mapping of Spawning and Juvenile Habitat of Selected Fish Species in the Laurentian Channel** - East Coast. This project will extend the sensitivity mapping work undertaken for finfish and shellfish on the Grand Banks and Scotian Shelf to the Laurentian Channel. The product of the work will be an atlas that displays the temporal and spatial variability in spawning/rearing habitat use for important fish species in the area. The atlas will be an important tool to assist in regulation of exploration activity to minimize effects on aquatic resources.
- **Effects of Oils and Sheens on Pelagic Seabirds** – East Coast. The University of Victoria and Dr Patrick O’Hara have been contracted to undertake a literature review of oil sheens and associated impacts on seabirds and a program of experimental bioassay to explore the mechanisms by which oil sheens impact seabirds.
- **Mitigation of Effects of Seismic Energy in Shallow Water Environments** - Mackenzie Delta. This study examines the effects of instantaneous pressure changes related to underwater seismic activity on eggs, sac fry and juvenile rainbow trout. Instantaneous pressure changes sometimes occur in the water column immediately adjacent to bore holes for winter seismic exploration of frozen waterbodies. The final report is expected in summer 2006 and a poster presentation will describe the results of this work at the Annual Larval Fish conference in Lake Placid New York on September 10-14, 2006.
- **Assessing the potential effects of nearshore hydrocarbon exploration activity on ringed (*Phoca hispida*) and bearded (*Erignathus barbatus*) seal populations in the nearshore Beaufort Sea.** The first two years of this ongoing study were utilized to develop a baseline of seal populations and movements near the proposed location of an exploration well in the shallow Beaufort Sea. Drilling commenced in the winter of 2005-06, and researchers were onsite to monitor the reaction of the seals to activities associated with the drilling of the well. Unfortunately the ice conditions were unsafe for seal monitoring most of the winter. The researchers still hope to acquire some data late in the winter, but it may come after the drilling has ended. There would still be some level of activity at the drilling location. If a second exploration well is drilled in the winter of 2006-07, this study may be extended to obtain another year of monitoring data. An ESRF report is tentatively targeted for later in 2006.

- **Waste Management – Use of Sumps and Other Disposal Methods in the Northwest Territories** – \$100,000. A Mackenzie Delta Sumps Workshop was held November 3 & 4, 2005 in Inuvik, NWT. The objective of the workshop was to inform all the participants of the various sump-related research projects which had been or were being conducted by various organizations. The participants included the researchers, representatives of a variety of government agencies, industry and regional committees. The consensus was that a lot of good work had been done to understand the status of the historical sumps. However, there is still a need to complete a sump database and to address some of the residual concerns expressed by the public. The possibility of a risk-based assessment of the historical sumps was discussed as a next step. The ESRF Management Board will consider options for advancing this work in 2006.
- **CSA Structures** - ESRF continued to support the CSA Offshore Structures Program in 2005 to ensure that International (ISO) Offshore Structures Standards are adopted into Canada as they become available, with national annexes that include unique Canadian requirements.

2006 Research Program

In 2006, the ESRF Management Board will initiate work in the following priority and subject areas. Technical advisory groups, comprising a cross-section of stakeholder interests, will be formed to develop detailed terms of reference and review technical reports for work to be offered for contract.

- **Evaluation of Seismic Impacts on Invertebrates** - \$200,000. This study will build on the extensive work already funded by ESRF on effects of seismic exploration on Atlantic snow crab and will also carry out experiments with American lobster under controlled seismic exposure conditions (in the laboratory and field) to evaluate the long-term effects on the health condition (e.g. shortened longevity, reduced reproductive capacity) and behavioural changes. The results will be of value in development and application of regulatory policy.
- **Fate and Transport of Drilling Mud and Fluid Discharges** - \$50,000. The ESRF Management Board will support a study to review the applicable predictive transport models for accidental bulk discharges of synthetic-based drilling muds in the offshore environment. The study will develop protocols for the delineation/validation of the discharge zone and identify reference points of concern for evaluation of risk to pelagic and benthic organisms.
- **Cumulative Effects Assessment – Development of Ecologically Based Thresholds for the Kendall Island Bird Sanctuary** – \$100,000. This project is proposed to build on a thresholds study recently completed for the Beaufort-Delta region. In the study, specific habitat models will be developed to aid in determination of habitat disturbance threshold

limits. Valued Components that are measurable and of practical value in assessing and minimizing impacts will be developed and confirmed with stakeholders, existing data and data gaps will be evaluated, and estimates of thresholds, carrying capacity and/or limits of acceptable change will be developed for the Valued Components. These tools may then be applied to KIBS as a representative example of their effectiveness in environmental management and the information will aid regulatory decision-making on development in and adjacent to KIBS.

- **Post-Construction Evaluation of the Ikhil Pipeline near Inuvik, NWT**- \$30,000. The objective of the study is to see if there are lessons to be learned about the assessment and approval process that will facilitate the assessment of future projects in the Inuvialuit Settlement Region (ISR). The study will review all the public documents and include interviews with many of the individuals involved in the assessment process. A consultant has been selected and the study should be completed by May 2006.
- **Evaluation of Produced Water Toxicity and Environmental Significance** - \$500,000. The ESRF Management Board has recognized the importance of produced water as the largest waste stream in offshore oil and gas operations. Regulatory agencies and the public are concerned over its discharge as there are numerous contaminants of environmental concern within production waters and preliminary evidence of associated impacts in the North Sea oil and gas fields. In 2006, the MB will begin a multi-year program of research to assess the potential for environmental risk from produced water discharges.
- **CSA Structures** - \$195,000. ESRF Management Board will continue to support the CSA Offshore Structures Program in 2006 to ensure that International (ISO) Offshore Structures Standards are adopted into Canada as they become available, with national annexes that include unique Canadian requirements.
- **Offshore Seabird Monitoring Program** - \$470,000. ESRF Management Board will enter into a multi-year Memorandum of Understanding with the Canadian Wildlife Service to carry out systematic and opportunistic collection of seabird monitoring data in Newfoundland marine areas, with an initial focus upon the northeast Grand Banks (site of current offshore production activities).
- **Assessment of Influence of Seismic Testing on Fish Movements and Behaviour** - \$200,000. ESRF will enter into Memorandum of Understanding with DFO COOGER to catalyze a larger study using non-ESRF funds to determine the effects of seismic testing on the behaviour, movement and survival of fish during and after exposure and the short and long-term physiological effects of seismic sound exposure on fish.

Financial Statement

ESRF Regions South (NRCan 1-16 North (IAND) 17-31	Revenue Forwarded Jan 1, '05	Administrative Expenditures 2005	Study Payments 2005	Levy Revenues & Adjustments	Outstanding Study Commitments	Uncommitted Funds as of Dec 31, 05
South	\$594,322.70	\$143,703.16	\$233,233.10	\$346,275.36	\$463,879.58	\$99,782.22
North	\$713,960.89	\$95,802.11	\$400,525.45	\$307,497.80	\$521,982.68	\$3,148.45
Total	\$1,308,283.59	\$239,505.27	\$633,758.55	\$653,773.16	\$985,862.26	\$102,930.67

Plans for 2006

In September 2005, the ESRF Management Board established the budget for the 2006 program, which will be supported by Levy #18. This program was recommended by the Management Board and has been approved by the Minister of Natural Resources Canada and the Minister of Indian Affairs and Northern Development. The program has an estimated value of \$1.5 million which includes funding for continuing 2005 programs and for new programs within the established priority areas of seismic impacts, cumulative effects, waste management, traditional knowledge, and effects on waterfowl and marine mammals, specifically in the northern offshore.

A budget of \$305,000 was approved for 2006 to cover the administrative costs of the ESRF Secretariat and to support travel by some members of the Management Board.

In 2005, one appointment to the Management Board was made.

Publication of Reports

All ESRF studies are subject to a scientific/technical peer review. Reports that are deemed to be scientifically or technically significant are published in the ESRF Technical Report Series. Reports are distributed to oil and gas companies, universities, federal, provincial and territorial government libraries, and research institutes. The series is documented on several international databases including the Canadian Institute for Scientific and Technical Information (CISTI).

ESRF now utilizes a website for publishing Requests for Proposals, notification of new publications, and general information on ESRF. Please visit our website at www.esrfunds.org

List of ESRF Reports

Since its inception in 1983, the ESRF has published 155 reports which are distributed free of charge. The latest reports have been posted on the ESRF website. You may obtain copies of reports by visiting the website at www.esrfunds.org or contacting:

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SEDIMENT TRANSPORT

- 017 Keith Philpott Consulting Ltd. with Acres Consulting Services Ltd. *Scour Around Seafloor Structures*. April 1986. 225 p.
- 027 Hodgins, D.O., D.A. Huntley, W.D. Liam Finn, B. Long, G. Drapeau and A.J. Bowen. *Sediment Transport - Present Knowledge and Industry Needs*. April 1986. 394 p.
- 029 Plasse, D. *Surficial Geology Surveys on the Scotian Shelf: Compilation of Maps from Government, Industry, University & Foreign Sources*. April 1986. 47 p.
- 041 Hodgins, D.O., G. Drapeau and L.H. King. *Field Measurements of Sediment Transport on the Scotian Shelf - Volume I. The Radio-isotope Experiment*. June 1986. 160 p.
Hodgins, D.O. and O.J. Sayao - *Volume II. Boundary Layer Measurement and Sand Transport Prediction*. August 1986. 222 p.
- 054 Hodgins, D.O., O.J. Sayao, E.D. Kinsella and P.W. Morgan. *Nearshore Sediment Dynamics -Beaufort Sea*. December 1986. 195 p.
- 061 Judge, J.T., R.K. Watanabe and J.L. Warner. *Seafloor Stability Study, Inner Scotian Shelf*. May 1987. 88 p.
- 096 Gillie, R.D. *Beaufort Sea Artificial Island Erosion Data*. May 1988. 119 p.

ENVIRONMENTAL EFFECTS AND MONITORING

- 001 McLaren, P.L. and R.A. Davis. *Distribution of Bowhead Whales in the Beaufort Sea*. Summer 1983. February 1985. 62 p.

- 005 Thomas, D.J., W.S. Duval, C.S. Johnston, G.S. Lewbel, A. Birdsall, M.S. Hutcheson, G.D. Greene, R.A. Buchanan and J.W. MacDonald. *Effects Monitoring Strategies and Program for Canada's East Coast*. May 1985. 88 p.
- 009 Harwood, L.A. and A. Borstad. *Bowhead Whale Monitoring Study in the Southeast Beaufort Sea*. July-September 1984. August 1985. 99 p.
- 021 Tidmarsh, W.G., R. Ernst, R. Ackman and T. Farquharson. *Tainting of Fishery Resources*. January 1986. 174 p.
- 025 Kingsley, M.C.S. *Distribution and Abundance of Seals in the Beaufort Sea, Amundsen Gulf & Prince Albert Sound*. 1984. February 1986. 16 p.
- 028 Thomson, D.H., D.B. Fissel, J.R. Marko, R.A. Davis and G.A. Borstad. *Distribution of Bowhead Whales in Relation to Hydrometeorological Events in the Beaufort Sea*. March 1986. 119 p.
- 036 Norton, P. and L.A. Harwood. *Distribution, Abundance and Behavior of White Whales in the Mackenzie Estuary*. June 1986. 73 p.
- 057 Duval, W.S. (ed.). *Distribution, Abundance and Age Segregation of Bowhead Whales Relative to Industry Activities and Oceanographic Features in the Beaufort Sea, August-September 1985*. March 1987. 117 p.
- 060 Yunker, M.B. and R.W. Drinnan. *Dispersion and Fate of Oil from Oil-based Drilling Muds near Sable Island, N.S.* January 1987. 169 p.
- 063 Drinnan, R.W., M. Yunker, A. Gillam, N. Charchuk and S.R.H. Davis. *Options for Treatment and Disposal of Oil-based Mud Cuttings in the Canadian Arctic*. February 1987. 167 p.
- 066 Nenninger, R.D. *Monitoring a Sump Containing Drilling Mud with High Salt Content*. March 1987. 47 p.
- 075 Cross, W.E. and B. Humphrey. *Monitoring the Long-Term Fate and Effects of Spilled Oil in an Arctic Marine Subtidal Environment*. August 1987. 120 p.
- 080 Ernst, R.J., W.M.N. Ratnayake, T.E. Farquharson, R.G. Ackman and W.G. Tidmarsh. *Tainting of Finfish by Petroleum Hydrocarbons*. September 1987. 150 p.
- 089 Ford, J.K.B., J.C. Cabbage and P. Norton. *Distribution, Abundance, and Age Segregation of Bowhead Whales in the Southeast Beaufort Sea, August-September, 1986*. November 1987. 53 p.

- 090 Wainwright, P.F. and B. Humphrey. *Analysis of Sediment Data from the Beaufort Shorebase Monitoring Program, 1982-1984*. March 1988. 78 p.
- 093 Hardy BBT Limited and Stanley Associates Engineering Ltd. *Handling and Disposal of Waste Drilling Fluids from On-Land Sumps in the Northwest Territories and Yukon*. February 1988. 58 p.
- 101 Erickson, P., B. Fowler, and D. Thomas. *Oil-based Drilling Muds: Off Structure Monitoring-Beaufort Sea*. June 1988. 188 p.
- 102 Nakashima, D.J. and D.J. Murray. *The Common Eider of Eastern Hudson Bay: A Survey of Nest Colonies and Inuit Ecological Knowledge*. November 1988. 174 p.
- 109 Lawrence, M.J. (ed.) and S.L. Davies (ed.) *Wildlife and Wildlife Habitat Restoration and Compensation in the Event of an Oil Spill in the Beaufort Sea*. March 1993. 88 p.
- 110 Hurlbut, S.E., D.P. French and B.J. Taylor. *Evaluation of the Potential Effects of Major Oil Spills on Grand Banks Commercial Fish Species as a Result of Impacts on Eggs and Larvae*. January 1991. 53 p.
- 117 Sekerak, A.D., N. Stallard and W.B. Griffiths. *Distribution of Fish and Fish Harvests in the Nearshore Beaufort Sea and Mackenzie Delta During Ice-Covered Periods, October-June*. November 1992. 157 p.
- 118 Thomas, D.J. *Considerations in the Design of Effects Monitoring Strategies: Beaufort Sea Case Study*. January 1992. 54 p.
- 121 S.L. Ross Environmental Research Limited and Ledrew, Fudge and Associates. *The Risk of Tainting Flatfish Stocks During Offshore Oil Spills*. January 1993. 67 p.
- 122 Mackinnon, D.S. and P.A. Lane. *Saltmarsh Revisited - The Long-Term Effects of Oil and Dispersant on Saltmarsh Vegetation*. September 1993. 24 p.
- 123 Duval, W.S. *Proceedings of a Workshop on Beaufort Sea Beluga February 3-6, 1992, Vancouver, B.C.* March 1993. 26 p.
- 134 Richard, P.R., A.R. Martin and J.R. Orr. *Study of Summer and Fall Movements and Dive Behaviour of Beaufort Sea Belugas, Using Satellite Telemetry. 1992-1995*. 34 p.
- 137 Hatch Associates Limited and Griffiths Muecke Associates. *Workshop on Cumulative Environmental Effects Assessment and Monitoring on the Grand Banks and Scotia Shelf. 2000*. 61 p.

- 138 Montevecchi, W.A., F.K. Wiese, G. Davoren, A.W. Diamond, F. Huettmann, J. Linke *Seabird Attraction to Offshore Platforms and Seabird Monitoring from Offshore Support Vessels and other Ships Literature Review and Monitoring Design*. 1999. 56 p.
- 139 Thomson, Denis H., Jack W. Lawson and Anne Muecke. *Proceedings of a Workshop to Develop Methodologies for Conducting Research on the Effects of Seismic Exploration on the Canadian East Coast Fishery, Halifax, Nova Scotia, 7-8 September 2000*. April 2001. 92 p.
- 142 ERIN Consulting Ltd. and OCL Services Ltd. *Sheens Associated with Produced Water Effluents – Review of Causes and Mitigation Options*. March 2003. Calgary. 46 p.
- 143 Mortensen, Pål B., Lene Buhl-Mortensen, Susan E. Gass, Donald C. Gordon Jr., Ellen L.R. Kenchington, Cynthia Bourbonnais and Kevin G. Macisaac. *Deep-Water Corals In Atlantic Canada: A Summary Of ESRF-Funded Research (2001-2003)*. December 2004. Calgary. 43 p.
- 144 Christian, John R., Anne Mathieu, Denis H. Thomson, David White and Robert A. Buchanan. *Effect of Seismic Energy on Snow Crab (Chionoecetes opilio)*. November 2003. Calgary. 106 p.
- 145 Racca, Roberto G., David E. Hannay, R. Bruce Murray, William B. Griffiths, and Michael Muller. *Testing Fish Deterrents for Use Under-Ice in the Mackenzie Delta Area*. March 2004. Calgary. 118 p.
- 146 Buchanan, Robert A., Joanne A. Cook and Anne Mathieu. *Environmental Effects Monitoring For Exploration Drilling*. December 2003. Calgary. 86 p
- 147 Dillon Consulting Limited with DMT Cordah. *Pollution Prevention Opportunities in the Offshore Oil and Gas Sector - Final Report*. October 2003. Calgary. 73 p
- 149 Trudel, K. 2004. *Workshop on Dispersant Use in Eastern Canada*. Environmental Studies Research Funds, Report No. 149, Calgary Alberta, 109 pp.
- 150 Martec Limited, CEF Consultants Ltd, DRDC Atlantic, St. Francis Xavier University. *Effects of Pipelines/Gathering Lines on Snow Crab and Lobster*. December 2004, Calgary, 61 p.
- 151 Lee, K., H. Bain, and G.V. Hurley, (eds). 2005. *Acoustic Monitoring and Marine Mammal Surveys in the Gully and Outer Scotian Shelf Before and During Active Seismic Programs*. December 2005. Calgary, 154 p + appendices.

- 152 Ellis & Associates. *Drilling Waste Management – Recommended Best Practices*. January 2005. Calgary. CD-Rom.
- 154 AMEC Earth & Environmental. *Inuvialuit Settlement Region Drilling Waste Disposal Sumps Study*. February 2005. Calgary. CD-Rom.
- 155 Dillon Consulting Limited and Salmo Consulting. *Beaufort-Delta Cumulative Effects Project*. February 2005. Calgary. CD-Rom.
- 156 Moulton, V.D., and B.D. Mactavish. *Recommended Seabird and Marine Mammal Observational Protocols for Atlantic Canada*. March 2004. Calgary. 80 p

OIL SPILL RESEARCH AND COUNTERMEASURES

- 006 Belore, R.C. *Effectiveness of the Repeat Application of Chemical Dispersants on Oil*. June 1985. 66 p.
- 012 Harper, J.R. and E.H. Owens. *Shoreline Monitoring Programs for Oil Spills-of-Opportunity*. September 1985. 50 p.
- 013 Abdelnour, R., T. Johnstone, D. Howard and V. Nisbett. *Laboratory Testing of an Oil-Skimming Bow in Broken Ice*. January 1986. 60 p.
- 018 S.L. Ross Environmental Research Ltd. *Testing of an Oil Recovery Concept for Use in Brash and Mulched Ice*. January 1986. 43 p.
- 019 Witherspoon, P., J. Swiss, R. Kowalchuk and J. Armstrong. *Oil in Ice Computer Model*. December 1985. 129 p.
- 031 Harper, J.R. and B. Humphrey. *Stranded Oil in Coastal Sediments: Permeation in Tidal Flats*. April 1986. 23 p.
- 033 Harper, J.R. *Practical Insights into Decision-Making for Shoreline Cleanup of Oilspills*. May 1986. 44 p.
- 034 Belore, R.C. *Development of a High Pressure Water Mixing Concept for Use with Ship-based Dispersant Application*. May 1986. 51 p.
- 051 S.L. Ross Environmental Research Ltd. and Energetex Engineering. *Decision-making Aids for Igniting or Extinguishing Well Blowouts to Minimize Environmental Impacts*. November 1986. 119 p.
- 053 MacNeill, M.R. and R.H. Goodman. *Oil Motion During Lead Closure*. January 1987. 13 p.

- 058 S.L. Ross Environmental Research Ltd. and Hatfield Consultants Ltd. *Countermeasures for Dealing with Spills of Viscous, Waxy Crude Oils*. October 1986. 59 p.
- 062 S.L. Ross Environmental Research Ltd. and D.F. Dickins Associates Limited. *Field Research Spills to Investigate the Physical and Chemical State of Oil in Pack Ice*. February 1987. 116 p.
- 064 Brown, H.M. and R.H. Goodman. *In Situ Burning of Oil in Ice Infested Waters*. February 1987. 27 p.
- 068 Belore, R.C. *Mid-Scale Testing of Dispersant Effectiveness*. April 1987. 82 p.
- 069 Hatfield Consultants Ltd. *Spills-of-Opportunity Research*. February 1987. 124 p.
- 070 Lane, P., M.J. Crowell, D.G. Patriquin and I. Buist. *The Use of Chemical Dispersants in Salt Marshes*. May 1987. 100 p.
- 072 Nawwar, A., A. Godon, H.W. Jones, E. Yeatman, J. Ohuja, M.B. Frish and I. Arvin. *Acoustical Methods for Measuring Thickness of Oil on Water*. April 1987. 57 p.
- 074 Bennett, J., I.R. McAllister, L. Pertile and D. McQuillan. *Removal of Stranded Oil from Remote Beaches by In-Situ Combustion*. March 1987. 122 p.
- 077 Comfort, G. *Analytical Modelling of Oil and Gas Spreading Under Ice*. August 1987. 57 p.
- 078 Reimer, E.M. and J.R. Rossiter. *Measurement of Oil Thickness on Water from Aircraft: A. Active Microwave Spectroscopy. B. Electromagnetic Thermoelastic Emission*. August 1987. 82 p.
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