VOLUME 5

REPORT OF TASK GROUP FOUR
Research and Scientific Study

FOR THE
BEAUFORT SEA STEERING COMMITTEE
April 1991

REPORT

by

TASK GROUP NUMBER FOUR

RESEARCH AND SCIENTIFIC STUDY

for

BEAUFORT SEA STEERING COMMITTEE

APRIL, 1991

Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada

Your file / Votre référence

MAR 2 0 [illegible]

Our file / Notre référence

Mr. Robert Hornal
Chairman
Beaufort Sea Steering Committee
Hornal Consultants Ltd.
401-1755 West Broadway
Vancouver, B.C.
V6J 4S5

Beaufort Sea Steering Committee: Task Group 4 Final Report

Dear Mr. Hornal:

On behalf of Task Group 4 I am pleased to submit our final report entitled Scientific Response Planning, Information Database Requirements and Environmental Assessment Methodology For an Oil Spill in the Beaufort Sea.

Task Group 4 was charged with addressing three recommendations of the Environmental Impact Review Board (EIRB) related to research and science. This Final Report is presented in three parts, each of which corresponds to a specific recommendation :

I	Isserk Recommendation #5	Scientific (Research) Response Plan;
II	Kulluk Recommendation #7	Environmental Assessment Methodology; and
III	Kulluk Recommendation #6	Information Database Requirements.

A consistent format is used for each of the three sections which includes a discussion of the background, scope and framework as determined by the EIRB recommendations and sections of the Inuvialuit Final Agreement (IFA), conclusions and recommendations.

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Canada

The Task Group succeeded in providing a "snapshot" of the status of research and science in the Beaufort area, and in focusing on the specific needs and requirements pursuant to the IFA.

We support the EIRB concept that an adequate information database needs to be available, since this is the very foundation for the entire review process as stipulated in the final agreement. The thrust of this work was to review the adequacy of that information database, to recommend on how best to use that information in assessing potential impacts, and to recommend a process for planning future research through both ongoing programs and " spills of opportunity ".

The task is a large one and one which, by its very nature, requires an iterative approach. We encourage other programs such as the Frontier Oil Spill Committee and the Beaufort Region Environmental Assessment and Monitoring (BREAM) Program to carry the Task Group 4 concepts and recommendations further.

The work was managed by a group of 10, representating the Inuvialuit, Industry and Government and was led by Bill Brakel of Environment Canada. With the tragic and unexpected loss of Bill in January, I volunteered to help complete the task.

Bill wrote much of what is contained in this report with a desire to challenge the reader and to force the scientist and bureaucrat alike to learn something from our 20 years of experience in the Beaufort Sea Region. I hope that we have succeeded in saving the flavour of his challenge.

Sincerely,

Rick Hurst
Manager, Environmental Studies

c.c.: Task Group 4 members

attach.

SCIENTIFIC RESPONSE PLANNING, INFORMATION DATABASE REQUIREMENTS AND ENVIRONMENTAL ASSESSMENT METHODOLOGY FOR AN OIL SPILL IN THE BEAUFORT SEA

FINAL REPORT

by

TASK GROUP NUMBER FOUR

RESEARCH AND SCIENCE

for the

BEAUFORT SEA STEERING COMMITTEE

MARCH, 1991

ACKNOWLEDGEMENTS

The present work was undertaken by the Beaufort Sea Steering Committee Task Group 4. Members of the Task Group were as follows:

Bill Brakel (DOE; Task Group Leader)
Duncan Hardie (DOE)
Lois Harwood (FJMC)
Manfred Hoefs (YTG)
Rick Hurst (DIAND)
Steve Matthews (GNWT)
George McCormick (COGLA)
Mike Papst (DFO)
Brian Smiley (DFO)
John Ward (AMOCO/CPA)

The members would like to acknowledge others for their patient and valuable review of the many drafts of this report; particularly Laura Johnston of DOE, Norm Snow of the Inuvialuit Joint Secretariat and Shawn Gill of COGLA. We would like to thank Dave Thomas (Seakem), Wayne Duval (ESL) and Mike Lawrence (North/South) for their assistance with the January 1991 Workshop on Information Databases, as well as the many other participants of that workshop. The report was structured and written by Bill Brakel with the assistance of all members and edited by Rick Hurst. Word processing tasks were completed by Diane Nixon.

BILL BRAKEL - IN APPRECIATION

Bill liked this project. His enthusiasm as Task Group 4 leader, however, developed slowly. First he had to overcome the reality that he would not be able to follow the well honed Brakel style of working behind the scenes, striking deals and orchestrating events so that the product bore the unmistakable but anonymous stamp of Bill Brakel. Instead he would be Task Group 4 Leader. He met the challenge. We as members of the Task Group were subjected to various and ever more complex flow charts and logic diagrams which attempted to make sense not only of the research and science component, but of the entire maze of interests and concerns with oil and gas development in the Beaufort Sea. His goal, as always, was to help bring the big picture into focus.

Bill wrote most of what is contained in the Task Group 4 Report with a strong desire to challenge the reader and to force the scientist and bureaucrat alike to learn something from our 20 years of experience in the Beaufort Sea Region. With the tragic and unexpected loss of Bill in late January, we have tried to finish what he started and to save the flavour of his challenge. We hope that we have succeeded. For Bill, success was achieved when a policy or a project in which he strongly believed finally came to fruition without any hint of his involvement. We hope that we will be forgiven for blowing his cover. Bill was a remarkable and irreplaceable friend and colleague. He is dearly missed.

BSSC TASK GROUP 4 FINAL REPORT

T A B L E O F C O N T E N T S

FORWARD

The present work was managed by the Beaufort Sea Steering Committee (BSSC) Task Group 4, composed of 10 representatives of the Inuvialuit, Industry and Government and led by Bill Brakel of Environment Canada. A list of Task Group 4 members and their affiliation is provided in Appendix 1. This Final Report expands on the Interim Report on Research and Science prepared for the BSSC (Brakel, December 12, 1990). It includes concepts which were identified at a co-ordinating meeting held in Winnipeg with leaders from BSSC Task Groups 1 and 2 in November 1990, and explored in more detail at a Workshop on Information Databases held in Calgary on January 17-18, 1991. The full Workshop Report will be presented as a component of the Beaufort Region Environmental Assessment and Monitoring (BREAM) Program 1991 Report (in preparation). This Final Report also incorporates review comments received from Task Group #4 members and others on several drafts.

BSSC TASK GROUP 4 FINAL REPORT

EXECUTIVE SUMMARY

The Minister of Indian Affairs and Northern Development established the Beaufort Sea Steering Committee (BSSC) in September 1990 to assess the concerns of the Environmental Impact Review Board concerning preparedness for an oilspill in the Beaufort Sea. Seven Task Groups were formed to assist the BSSC. Task Group Four was charged with addressing three recommendations related to research and science. This Final Report is presented in three parts corresponding to those recommendations:

I.	Isserk Recommendation #5	Scientific (Research) Response Plan;
II.	Kulluk Recommendation #7	Environmental Assessment Methodology; and
III.	Kulluk Recommendation #6	Information Database Requirements.

The work was managed by Task Group 4, composed of 10 representatives of the Inuvialuit, Industry and Government and led by Bill Brakel of Environment Canada. A list of Task Group 4 members and their affiliation is provided in Appendix 1. This Final Report expands on the Interim Report on Research and Science prepared for the BSSC (Brakel, December 12, 1990). It includes concepts which were identified at a co-ordinating meeting held in Winnipeg with leaders from BSSC Task Groups 1 and 2 in November 1990, and explored in more detail at a Workshop on Information Databases held in Calgary on January 17-18, 1991. This Final Report also incorporates review comments received from Task Group #4 members and others on several drafts.

A consistent format is used for each of the three sections and includes the following: the background leading to the EIRB recommendations; the scope and framework for the work as determined principally by sections of the Inuvialuit Final Agreement (IFA) and the EIRB recommendations; a discussion section which uses a series of premises supported by a brief rationale and a consideration of the present status and needs; and finally a section of conclusions and recommendations. A summary of the three parts of the report is provided below.

PART 1: SCIENTIFIC RESPONSE TO A BEAUFORT SEA OIL SPILL

Isserk Recommendation 5: Encourage the creation or the reactivation of a scientific response team capable of conducting useful research in direct and immediate response to a Beaufort Sea oil spill.

In November 1989 the Environmental Impact Review Board (EIRB) made recommendations based on its review of the Esso, Chevron et al. Isserk drilling program. One of the recommendations to the Minister of Indian and Northern Affairs Canada was that: "(the Department should) convene meetings of Inuvialuit, industry and government representatives within 90 days to deal with all aspects of compensation and financial responsibility under the IFA."

In March 1990 a workshop was convened in Inuvik and resulted in six (6) recommendations for follow up (hereafter referred to as Isserk recommendations 1-6). Isserk Recommendation 5 is presented verbation above.

The urgency of implementing these workshop recommendations was underscored by the EIRB following its review of the proposed Gulf Kulluk drilling program. They noted concerns identified by the Inuvialuit Petroleum Corporation (IPC) arising from the role of the scientific community during the Exxon Valdez spill response. IPC suggested that "most of the scientific work is primarily done to protect Exxon and the U.S. government from lawsuits, instead of constructively trying to contribute to the best and most active restoration of wildlife and environment (and) is questionable".

The scope of Part I of this report is limited to research that can take place only during and after an actual oil spill. Other spill-related research, which can be done under "normal" field conditions or in laboratories, is excluded from the scope of this exercise. Further, a scientific response may or may not include damage appraisal or "body counts" of the number of animals killed by the oil spill.

Part I considers the components of a scientific (research) response under the elements of planning, implementation and operations with an emphasis on the planning phase. Project selection, financial authority and roles and responsibilities are discussed.

An approach to planning and implementing the scientific response to an oil spill is outlined. The Task Group concludes that other approaches may be discovered and refined to the point of practicality through further consideration but that regardless of these refinements, the scientific response must be a commitment; pre-planned to the extent that is possible; integrated within contingency plans; and assigned to a responsible manager within the spill response team.

CONCLUSIONS AND RECOMMENDATIONS

1. A major oil spill in the Beaufort Sea would provide the opportunity to gain important, practical scientific information that would help to support contingency planning and spill response operations in the future.

2. Should a spill of significant duration and size occur, access to logistics, support facilities and financing could be a major barrier to mobilizing an effective and credible scientific response.

3. The research response must be planned to the maximum extent possible. Opportunities must be created to integrate research efforts as part of the overall contingency plan which presently includes countermeasure plans, cleanup plans and wildlife protection plans. In essence, the research response must become part of the overall spill response effort in order to be successful.

4. Industry, government and the Inuvialuit should develop a joint mechanism/procedure for establishing and periodically updating research priorities and for priorizing which activities to carry out in the event of a spill. Industry should take the lead in this initiative, possibly through its Frontier Oil Spill Committee under the Task Force on Oil Spill Preparedness (TFOSP) initiative.

5. Priorities for useful research should be identified in anticipation of future spills. Criteria used to determine priorities should include the following:

   - improving the effectiveness of marine countermeasures and shoreline clean-up;
   - quantifying, predicting and reducing the effects of spills on wildlife, their habitats and harvesting;
   - quantifying, predicting and reducing the adverse effects of countermeasures and clean-up techniques on wildlife, their habitats and harvesting;
   - improving the ability to restore wildlife and their habitats; and
   - reducing liability, compensation and spill response costs.

6. Research "modules", including approximate budgets, potential researchers and logistical and support requirements, should be constructed so that they require minimal "tinkering" before implementation.

7. A new member of the spill response team, the On-Scene-Science-Coordinator (OSSC) selected from industry and reporting to the On-Scene-Commander, should become the focal point for implementing the scientific research modules. The final selection of projects for implementation would be the responsibility of the On-Scene-Science-Coordinator in consultation with a representative(s) from the federal government and the Inuvialuit.

PART II: ENVIRONMENTAL ASSESSMENT METHODOLOGY

Kulluk Recommendation 7: The Department of Fisheries and Oceans and the Department of Environment must undertake, as a matter of the highest priority, a study to define the assessment methodology that should be used in determining the impacts that might be associated with a major oil spill incident in the Beaufort Sea. The Canadian Petroleum Association, the Inuvialuit and the Governments of the Northwest Territories and Yukon, should be involved in developing the terms of reference for this study and in its implementation to the extent appropriate.

The EIRB, in considering the impact assessment methodology employed by the proponent (Gulf) in its proposed Kulluk Drilling Program, 1990-1992, focused on the assessment of a catastrophic oil spill. The EIRB suggested that the

impact assessment methodology used by the proponent was vague and non-quantitative, and that the definitions used did not allow the Board to form useful judgements with regard to the levels of impact that were predicted.

They cited the failure of the proponent to provide a review of the potential effects of the spill response activities on wildlife populations and resource harvesting, and stressed the high priority attached to development of a standard and widely accepted methodology for the assessment of biological impacts that could be associated with an offshore oil spill.

Part II of this report addresses the scope of environmental assessment for developments within the Inuvialuit Settlement Region (ISR) as prescribed by the Inuvialuit Final Agreement (IFA). The thrust and scope of the IFA review process is drawn from section 13 of the IFA: wildlife, wildlife harvest and compensation for present and future harvest loss. In the offshore area, the Inuvialuit screening and review process is restricted, under section 11.(2) of the IFA, to the purposes wildlife compensation. The objectives of this assessment process are to recommend to the government authority competent to authorize the development, whether or not the development should proceed and, if it should, on what terms and conditions, including mitigative and remedial measures (IFA: Section 11.(24)).

A working definition of Environmental Assessment of an oil spill in the IFA context is offered as follows: the process whereby one predicts the potential direct and indirect effects of an oil spill and the impact on present and continuing harvest opportunities and/or success.

Task Group Four concludes that the scope of assessment review by the Environmental Impact Review Board (EIRB) is prescribed under the Inuvialuit Final Agreement. This assessment review process is not identical to either the Federal Environmental Assessment and Review Process (EARP) or regulatory decision-making processes under other federal statutes. The impact assessment methodology used should be descriptively precise, semi-quantitative to the extent possible and explicit in terms of "impact" linkages. It should create a logic or "audit" trail. It should follow a standardized approach for purposes of consistency and acceptance, but each review should be "tailor made" to the extent necessary for each development proposal. The impact assessment methodology developed by ESL for Environment Canada and Public Works Canada and later adapted for Fisheries and Oceans Canada could not be assessed by all Task Group 4 members but may be an appropriate methodology for EIRB reviews.

CONCLUSIONS AND RECOMMENDATIONS

1. The scope of impact assessments by the EIRB for offshore development is prescribed by Sections 11 (Environmental Impact and Review Process) and 13 (Wildlife Compensation) of the Inuvialuit Final Agreement. The focus is on harvesting opportunities and success. The scope is not identical to that of either the federal Environmental Assessment Review Process (EARP) or regulatory decision-making processes under other federal statutes.

2. Impact assessments for offshore developments within the Inuvialuit Settlement Region are intended to address the interests of the people living in the region and the public at large, and should be driven by the concerns that were identified during previous screenings or reviews of similar Beaufort Sea developments or of the project itself.

3. An assessment methodology should be semi-quantitative and standardized to the extent possible, and should have the following attributes: first, it should provide a systematic and semi-quantitative framework for determining potential environmental effects; second, it should provide consistent criteria for evaluating impacts on wildlife populations, their habitats, and their harvest; and third, it should compel assessors to maintain an audit trail of assumptions, calculations, rationale statements and references.

4. The impact assessment methodology originally developed by ESL Environmental Sciences Limited for Public Works Canada and Environment Canada, and later refined and adapted for the Department of Fisheries and Oceans should be further scrutinized as a potential methodology for adaptation to EIRB reviews.

5. An impact assessment methodology should be established following review of the above through discussions between the proponent and EIRB staff and consultants. Application of the methodology to a specific project will then provide the opportunity for the IGC, WMACs, FJMC, EIRB and government agencies to evaluate its effectiveness. The assessment methodology could then be fine-tuned to the extent necessary during the course of subsequent project reviews.

6. The impact assessment methodology should (as prescribed by the IFA) be aimed specifically at negative impacts on actual and future wildlife harvest loss, on mitigative and remedial measures, on the potential liability of the developer for restoring wildlife and its habitat, and on liability for compensation to Inuvialuit hunters, trappers and fishermen.

7. The impact assessment methodology should, in order to be realistic, assume that there will be some success in mitigation (e.g. relief well drilling, marine countermeasures, etc.). The potential success of this mitigation should be predicted by the proponent and independently assessed by the Government Authority.

8. Using the methodology described above as a basis, the specific assessment should be tailor-made to the extent necessary for each development proposal in order to match the project-specific requirements. Agreement on the scope of the assessment for a specific project proposal should be reached by representatives from the proponent and the EIRB and its support staff, and recorded prior to a public review.

PART III: INFORMATION DATABASE

Kulluk 6: An independent task force must be established to examine the research, management and funding requirements necessary to ensure that the information database is in place to facilitate environmental impact assessment and countermeasures and contingency planning, relating to an offshore oil spill in the Beaufort Sea.

The Environmental Impact Review Board (EIRB) identified information database deficiencies relating to impact assessment, countermeasures and contingency planning as one of the factors contributing to its decision to recommend that the Kulluk drilling program not be approved (Public Review of the Gulf Resources Ltd. Kulluk Drilling Program 1990-1992; June 28, 1990; 66 pp). The specific recommendation from the Kulluk review is presented verbatim above.

The EIRB further suggested (Kulluk 2) that all oil spill contingency plans should include oil spill countermeasure plans, oil spill clean-up plans and oil spill related wildlife protection plans.

In making its recommendation, the EIRB challenged the proponent "that, according to Gulf, there does not exist a reliable body of information to enable it to provide the Board with any estimates, assumptions, models, or data on the crucial areas of shoreline impacts, shoreline response, and clean-up standards". The EIRB concluded that "there is, based on the evidence and information presented at this Public Review, an urgent need to develop an up-to-date database to support oil spill assessment, countermeasures and contingency planning".

Part III of this report examines the scope of the information database requirements in the context of the Inuvialuit Final Agreement (IFA) as prescribed by sections 11 and 13 of the IFA.

Section 11.(24) of the IFA establishes that the EIRB shall expeditiously review all projects referred to it and on the basis of the evidence and information before it shall recommend whether or not the development should proceed and, if it should, on what terms and conditions, including mitigative and remedial measures.

The focus of the present work is on:

I. determining the status of the information database necessary for the purposes of environmental assessment of oil spills and contingency planning (as defined by the EIRB Kulluk Recommendation #2 as countermeasures, clean-up and wildlife protection); and

II. determining the sufficiency of existing databases to enable the EIRB to review offshore drilling proposals relative to its IFA mandate (i.e. wildlife harvesting and compensation as specified in the IFA Sections 11 and 13).

CONCLUSIONS AND RECOMMENDATIONS

1. Task Group 4 supports the EIRB concept that an adequate information database needs to be available since this is the very foundation for the entire review process as stipulated in the Inuvialuit Final Agreement. This database is necessary for the purposes of environmental prediction and assessment of oil spill scenarios and for contingency planning (as defined by the EIRB as marine countermeasures, clean-up and wildlife protection).

2. The Beaufort Sea area has been under intense study by physical and biological scientists for nearly twenty years. Hundreds of millions of dollars have been spent by industry and government conducting baseline and other studies on virtually every aspect of the Beaufort Sea environment. The present information database is extensive and comprehensive.

3. The EIRB will base its decisions and recommendations on the information and evidence before it. The proponent and government must be diligent in bringing all relevant information before the Board.

4. In the absence of a catastrophic oil spill offshore in the Beaufort Sea many impact hypotheses will, by necessity, remain untested. This information, which can only be obtained following a major spill, forms the bulk of the "missing or inadequate" information database. To capitalize on any "spill of opportunity" a research response should be developed to the maximum extent possible prior to a spill occurring (see Task Group 4 Final Report on Isserk Recommendation #5).

5. There will always be a surplus of reasonable scientific questions raised during environmental reviews relative to the ability of scientific information database to provide conclusive, scientific sound answers. There must, therefore, be a change in focus towards what are bonafide needs as opposed to weak links or data gaps; the focus must shift from what we don't know to what we need to know.

6. The present work includes a set of definitions, a matrix framework and tables which are useful tools towards determining the status and the adequacy of the existing information database. It also identifies opportunities for gathering the type and quality of data necessary to allow informed recommendations by the EIRB. This structured approach should be refined and applied on an iterative basis towards directing research and monitoring efforts.

7. The "candidates" for further research and monitoring identified by Task Group 4 should be further assessed and refined in a process which uses impact hypotheses, linkages and a more rigorous interpretation and determination of the adequacy of existing information. The Beaufort Environmental Monitoring Program (BEMP) was successful in this task but did not consider the catastrophic oil spill; this should be undertaken by the successor to BEMP, the Beaufort Region Environmental Assessment and Monitoring (BREAM) Program, which is being initiated by DIAND, DOE and DFO as a planning component of the Northern Oil and Gas Action Program (NOGAP).

BSSC TASK GROUP 4 FINAL REPORT
PART I

SCIENTIFIC RESPONSE TO A BEAUFORT SEA OIL SPILL
ISSERK RECOMMENDATION #5

Isserk 5: Encourage the creation or the reactivation of a scientific response team capable of conducting useful research in direct and immediate response to a Beaufort Sea oil spill.

1.0 BACKGROUND

In November 1989 the Environmental Impact Review Board (EIRB) made recommendations based on its review of the Esso, Chevron et al. Isserk drilling program. One of the recommendations to the Minister of Indian and Northern Affairs Canada was that: "(the Department should) convene meetings of Inuvialuit, industry and government representatives within 90 days to deal with all aspects of compensation and financial responsibility under the IFA."

In March 1990 a workshop was convened in Inuvik to respond to the recommendation (Workshop: Wildlife Compensation and the Inuvialuit Final Agreement; March 21 and 22, 1990; 19 pp.). It addressed Wildlife Compensation and the Inuvialuit Final Agreement (IFA) and resulted in six (6) recommendations for follow up (hereafter referred to as Isserk recommendations 1-6).

Isserk Recommendation 5 is presented verbatim above.

The urgency of implementing these workshop recommendations was underscored in the recommendation made by the EIRB following its review of the proposed Gulf Kulluk drilling program. In its report (July, 1990) the EIRB noted concerns identified by the Inuvialuit

Petroleum Corporation (IPC) arising from the role of the scientific community during the Exxon Valdez spill response. IPC suggested that "most of the scientific work is primarily done to protect Exxon and the U.S. government from lawsuits, instead of constructively trying to contribute to the best and most active restoration of wildlife and environment" and that "Most of the scientific work done on the oil spill is questionable". (Inuvialuit Petroleum Corporation: Report on the Trip to Valdez to Investigate the Matter of Compensation, March, 1990).

2.0 SCOPE

This recommendation is limited to research that can take place only during and after an actual oil spill. Information obtained from these "spills of opportunity" will assist in confirming or rejecting predictions made when the information database was either limited or unavailable, or was in the form of surrogate information transferred from other geographic areas. The information will increase our understanding of the effects of an oilspill and assist in future impact assessments.

The scientific response to spills of opportunity should not be equated to the separate task of the Arctic Region Environmental Emergencies Team (AREET) which is to provide advice to the On-Screen Commander during a spill response. Other spill-related research, which can be done under "normal" field conditions or in laboratories, is excluded from the scope of this exercise. Further, a scientific response may or may not include damage appraisal or "body counts" of the number of animals killed by the oil spill.

Since there are few spills offering research opportunities in the Beaufort Sea, the scientific response should not be restricted to any particular class or size of oil spills. All sizable spills should be treated as potential opportunities for conducting useful research, although it is recognized that minor fuel spills during routine operations are unlikely to provide useful opportunities.

3.0 FRAMEWORK

The Inuvialuit Final Agreement (IFA) does not specify that scientific responses to oil spills should be undertaken. However, practical and valuable results from a scientific response could be applied to impact assessment, spill response strategies and tactics, and to further development of countermeasures, recovery and cleanup techniques; all of which have a bearing on the application of the IFA. Additional applications for these results are linked more closely with Sections 11 and 13 of the Inuvialuit Final Agreement: wildlife and wildlife habitat remediation and mitigation; compensation for present and future harvest loss; and costs affecting financial liability under the "worst case" scenario.

The pragmatic context for a scientific response to a Beaufort Sea oil spill as outlined above may not cover the broader range of research interests that can usefully fill data gaps, extend knowledge bases and investigate the nature of physical and biological sciences. While it is appropriate that practical focused research should receive priority in terms of the issues that arose from the Isserk and Kulluk drilling program reviews, provisions must also be made for other research interests, if only to take full advantage of the research opportunities that a spill would offer.

4.0 DISCUSSION

4.1 Analysis

For purposes of discussion, a number of premises are put forward and supported by a brief rationale.

Premise 1: The spill response, including well control, countermeasure deployment, and oil recovery and cleanup, must be given first priority whenever a spill occurs.

Rationale: Only human safety is more important than spill response activities to protect the Beaufort Sea environment and wildlife resources should a spill occur.

Premise 2: The launching of a scientific response during an oil spill could interfere with marine countermeasures, shoreline cleanup and wildlife protection efforts and could result in a net environmental loss.

Rationale: In the event of a spill resources will be limited. In addition to potentially interfering with spill response operations, a scientific response will also face limited access to logistical support facilities including aircraft, vessels and accommodations. Furthermore, the mitigative measures themselves (e.g. clean-up, disposal) could have adverse impacts which would result in net environmental loss.

Premise 3: There is potentially much more to doing oil spill research than holding a post mortem assessment of effects from the spill, after the spill response is over.

Rationale: Useful research in response to an oil spill includes testing, evaluation, and assessment under spill conditions and may include direct research on oil behaviour, detection and tracking; marine countermeasures and oil recovery; shoreline cleanup; waste management; habitat restoration; and others.

Premise 4: The detailed conduct of "spills of opportunity" research, albeit pre-planned in terms of the data/results that are desired and the priorization of information needs, still depends on operational planning that can be done only after the nature and extent of the spill are known and have been assessed.

Rationale: A scientific response must reflect the many variables that are associated with a spill; such as when? where? under what conditions? how much oil will be spilled? how long will the spill last? where will the oil go? Only when answers to the above types of questions are available can we determine what research can actually be undertaken during or subsequent to a spill.

Premise 5: The nature and scope of potentially useful research in the event of a Beaufort Sea oil spill is extensive. This research must be fine-tuned and focused in order to take advantage of any research opportunities that become available, and to ensure that the most appropriate projects are undertaken.

Rationale: Few spills have occurred in the Beaufort Sea offering opportunities for research. No large or catastrophic spills have occurred. Consequently, field trials have been limited. Much meaningful oil spill related research cannot be either duplicated under laboratory conditions or transferred from other geographic areas. Therefore, there is a "backlog" of research projects which can be undertaken only when a spill occurs. Timing for a scientific response

will be critical for some projects. In most cases, potential investigators will be facing on-going commitments to other projects which also may be at varying stages of critical development. Logistical support, and the availability of financial resources and appropriate scientific expertise will limit the level of research that can take place during a spill.

Premise 6: The risk of congestion, confusion, and an uncoordinated response by scientific researchers within Canada and internationally is sufficiently great that it may jeopardize the attainment of useful scientific research.

Rationale: An oil spill of significant size in the Beaufort Sea will attract attention from a wide range of interested observers and polar researchers. The existence of such a range of capable researchers does not, however, significantly lessen the extent of potential problems that may prevent "useful" results from being obtained.

Premise 7: Ready access to financial resources/authority to undertake studies once a spill occurs can be a major obstacle to conducting useful research and to the ability of researchers to initiate their work promptly.

Rationale: Valuable time will be lost, amidst the demands of the spill response, unless researchers can begin their work with confidence that financial and administrative arrangements are already in place.

Premise 8: The selection of useful research must bring together interests that range from improving the basic understanding of physical, biological and environmental events and acquiring related baseline data, to gaining specific results with direct application to the oil spill portion of regulatory and review processes.

Rationale: Research interests and therefore priorities vary widely, as do the many types of research interests that would be connected with an oil spill in the Beaufort Sea. These interests, for example, could include performance evaluation of countermeasure and cleanup strategies and equipment; the behaviour, fate and persistence of oil; the short and longer term environmental effects of oil spills; and impacts from the spill itself and/or the spill response on wildlife populations, habitats, and present and future harvesting.

4.2 Scientific Response Requirements

The components of a scientific response are discussed below under three elements:

I. Planning;
II. Implementation; and
III. Operations.

I. Planning

Planning includes the following two tasks:

- identify candidate studies and establish priorities for scientific response activities relating directly to the Inuvialuit Final Agreement: i.e. contingency plans, spill response, wildlife harvesting and restoration, and financial liability.

- identify candidate studies and establish priorities for scientific response activities relating to interests that may be beyond the scope of the Inuvialuit Final Agreement but are nonetheless important: e.g. data gaps, marine and wildlife biology, and physical sciences.

The identification of candidate studies is the least demanding part of a scientific response. The challenge will be to set priorities for the research projects given the broad range of scientific disciplines that are involved and the backlog of spill-related research interests. The combined interests of the Inuvialuit, industry, and government must be brought together and accommodated in a scientific response program which identifies candidate studies, the spill conditions best suited to their undertaking, their relative priority, key personnel, and the source of funding.

The essential ingredients to accomplish this planning are: an agreement by the Inuvialuit, industry and government to undertake this endeavour; the commitment of financial resources to support this planning; the selection of an appropriate mechanism; and participation in the planning process by representatives and scientific experts from the Inuvialuit, industry and government.

This necessary planning can take place using one or a combination of mechanisms and financial support.

If industry was to lead the planning exercise, they could for example choose to use the Beaufort Sea Spill Cooperative, a joint venture contract by companies with offshore lands for oil and gas exploration, or the Environmental Studies Research Fund (ESRF). Another avenue is to use the industry led Task Force on Oil Spill Preparedness (TFOSP), formed in 1989 by the Canadian Petroleum Association (CPA) and the Independent Petroleum Association of Canada (IPAC) following the Nestucca and Exxon Valdez spills. The Frontier Oil Spill Committee for the offshore component of the TFOSP initiative could be approached to undertake this task.

Within government, earlier work under the Beaufort Environment Monitoring Program (BEMP) included an assessment of research and monitoring needs for all aspects of offshore oil and gas development activities, except catastrophic oil spills. Additional work is underway through the Northern Oil and Gas Action Program (NOGAP) to address oil spill research and monitoring needs through the successor to BEMP, the Beaufort Environmental Assessment and Monitoring Program (BREAM) Program. BREAM could undertake the planning tasks identified above.

The Inuvialuit Game Council or the yet to be established Inuvialuit Research Advisory Council (IFA Section 14(80-87)) could offer additional options.

In recognition of the need for one co-ordinated planning mechanism, and of the premier role and interest of industry in this task, it seems appropriate that industry take the lead in establishing a planning mechanism.

The planning phase will not be a simple task and will depend on adequate financial support. There is, as was noted above, a backlog of spill-related scientific interests and there have been few opportunities for field studies in the Beaufort Sea under actual spill conditions. Following the Nestuca spill off the coast of B.C. and the Exxon Valdez spill in Alaska, public concern throughout Canada has focused on oil spills. The recent report by the Brander-Smith Panel on Tanker Safety and Oil Spill Response included Beaufort Sea exploration activities for oil and gas as part of its recommendations. Moreover, planning for a spill response, including a scientific response, is where attention will remain focused unless a spill actually occurs.

II. Implementation

Further action, once planning is complete, depends on the occurrence of an actual spill and will involve the following tasks:

- determine which research priorities best match the opportunities and conditions presented by the spill as soon as possible after the spill occurs;

- authorize use of financial resources by scientific personnel; and

- mobilize scientific personnel.

The initiation of a scientific response can not wait until a spill response is well in-hand or completed. Some of the most useful activities will need to take place concurrently and side-by-side with spill response activities. The period immediately following a spill is the most critical time for assessing the nature, extent and conditions affecting the scientific response and for initiating studies which must take place during the early stages of a spill.

Project selection: By giving special attention during the planning process to identifying those projects which need to be mobilized immediately when a spill occurs, the difficulties in selecting early response projects can be largely eliminated. Less urgent projects (e.g. bioremediation, habitat restoration) can be selected while spill control efforts are on-going.

Financial authority: Financial responsibility for scientific response projects can be partially negotiated during planning. However, because the appropriate scope of the scientific response will not be known until a spill occurs, a high level of

uncertainty will persist until actual project selection can take place. This must be reduced to the greatest extent possible. The scientific response could include research of direct interest to industry and Inuvialuit and costs could reasonably be borne by the proponent; other research may be useful primarily to Government and the costs would be borne accordingly.

The Spill Scene: In keeping with the scenario that an oil spill will have occurred in the Beaufort Sea, implementation of the scientific response must be simple and direct. In an actual oil spill event, the reality will be that the On-Scene-Commander (OSC) has assumed full responsibility for the spill response and control efforts are getting underway; the Arctic Region Environmental Emergencies Team (AREET) has assembled and is available to provide environmental advice to the OSC; and the Beaufort Sea Spill Cooperative is fully mobilized. Without prior planning and agreement, few practical options exist for implementing a scientific response under these circumstances.

The single-most important factor influencing the implementation of a scientific response is considered to be the potential contribution by industry in association with spill response activities. Provisions for implementing the response plan are proposed in the conclusions (Section 5).

III. Operations during spill response

Successful scientific response operations during a spill require:

- access to facilities and equipment: aircraft; vessels; field equipment and supplies; analytical equipment, workspace, storage facilities; accommodation; etc.

- coordination and integration with spill response activities.

An On-Scene-Science-Coordinator, working with the On-Scene-Commander, should be responsible for scientific response operations. This responsibility would include providing access and support to the scientific response teams, and arranging for the coordination and integration of the scientific response as part of the overall spill response effort. Priority would be given to those studies that had been selected through the planning process.

Other scientific interests, beyond the scope of the planned scientific response, would receive lower priority. By virtue of the extent to which the spill response took control over support and logistical facilities, these studies would not be conducted until the level of the spill response had subsided.

In summary, one approach to planning and implementing the scientific response to an oil spill has been outlined above. Other, and quite possibly better, approaches may be discovered and refined to the point of practicality through further consideration. Regardless of these refinements, however, the scientific response must be a commitment; pre-planned to the extent that is possible; integrated within contingency plans; and assigned to a responsible manager within the spill response team.

5.0 CONCLUSIONS

1. A major oil spill in the Beaufort Sea would provide the opportunity to gain important, practical scientific information that would help to support contingency planning and spill response operations in the future.

2. Should a spill of significant duration and size occur, access to logistics, support facilities and financing could be a major barrier to mobilizing an effective and credible scientific response.

3. The research response must be planned to the maximum extent possible. Opportunities must be created to integrate research efforts as part of the overall contingency plan which presently includes countermeasure plans, cleanup plans and wildlife protection plans. In essence, the research response must become part of the overall spill response effort in order to be successful.

4. The research response plan should address not only the effectiveness of countermeasures and clean-up techniques but also the potential adverse effects of such techniques on wildlife, their habitats and harvesting.

5. The preparation of a useful research response must involve the Inuvialuit, industry, and government regulators and scientists.

6. Notwithstanding the fact that specific research opportunities can be identified only after the facts about that spill are known, the initiation of a scientific response can not wait until a spill response is well in-hand or completed. Some of the most useful research activities will need to take place concurrently with spill response activities.

7. Similarly, while the detailed preparations for conducting useful research must follow the actual occurrence of an oil spill, and despite (or partly because of) the fact that only a small fraction of the potentially useful research can be conducted in response to any single spill, prior preparation, planning and priorization is essential.

8. Monitoring of what is happening during a spill, and the effective and reliable communication of this information to the people potentially affected most by the spill (i.e., the Inuvialuit), while important, should not be confused with conducting useful research in response to the spill.

9. The existence of a planned research response will not necessarily overcome the proprietary nature of some research data which may be required for litigation/arbitration.

10. The conduct of useful or focused research, selected jointly by industry, government and the Inuvialuit, is potentially threatened by interference from other research activities through competition for resources such as logistical support and facilities. The research response plan should include means for ensuring that priority research and monitoring projects receive preferential treatment.

11. The "team" for "a scientific response.... capable of conducting useful research" (as cited in Isserk recommendation 5) should include:

- a joint planning mechanism/procedure for selecting potential priority research before a spill occurs;
- an On-Scene Science Co-ordinator reporting to the On-Scene Commander;
- a group of technical advisors/analysts who could select the actual detailed projects once the facts about a spill are known; and
- a group of research personnel who become actively engaged in the scientific response.

6.0 RECOMMENDATIONS

1. Priorities for useful research should be identified in anticipation of future spills. Criteria used to determine priorities should include the following:

   - improving the effectiveness of marine countermeasures and shoreline clean-up;

   - quantifying, predicting and reducing the effects of spills on wildlife, their habitats and harvesting;

   - quantifying, predicting and reducing the adverse effects of countermeasures and clean-up techniques on wildlife, their habitats and harvesting;

   - improving the ability to restore wildlife and their habitats; and

   - reducing liability, compensation and spill response costs.

2. Industry, government and the Inuvialuit should develop a joint mechanism/procedure for establishing and periodically updating research priorities; and for priorizing which activities to carry out in the event of a spill. Industry should take the lead in this initiative, possibly through its Frontier Oil Spill Committee under the Task Force on Oil Spill Preparedness (TFOSP) initiative or some other appropriate mechanism.

3. Research "modules", including approximate budgets, potential researchers and logistical and support requirements, should be constructed so that they require minimal "tinkering" before implementation.

4. Criteria for selecting particular projects as well as their priority must be identified during the planning process. This information would be used to select research response "modules" for implementation on the basis of their priority and suitability under specific spill conditions: e.g. sea state, temperature regime, ice conditions; open water versus through ice-drilling, etc.

5. A new member of the spill response team, the On-Scene-Science-Coordinator (OSSC) selected from industry and reporting to the On-Scene-Commander, should become the focal point for implementing the scientific research modules. The final selection of projects for implementation would be the responsibility of the On-Scene-Science-Coordinator in consultation with a representative(s) from the federal government and the Inuvialuit.

6. The issue of financial responsibility for implementing the various modules of a research response must be further addressed by all parties as an integral part of the planning process.

BSSC TASK GROUP 4 FINAL REPORT
PART II

ASSESSMENT METHODOLOGY
KULLUK RECOMMENDATION #7

Kulluk 7: The Department of Fisheries and Oceans and the Department of Environment must undertake, as a matter of the highest priority, a study to define the assessment methodology that should be used in determining the impacts that might be associated with a major oil spill incident in the Beaufort Sea. The Canadian Petroleum Association, the Inuvialuit and the Governments of the Northwest Territories and Yukon, should be involved in developing the terms of reference for this study and in its implementation to the extent appropriate.

1.0 BACKGROUND

The EIRB, in considering the impact assessment methodology employed by the proponent (Gulf) in its proposed Kulluk Drilling Program, 1990-1992, focused on the assessment of a catastrophic oil spill.

In making its recommendations including Kulluk Recommendation 7 above (EIRB; June 28, 1990; 66 pp), the EIRB suggested that the impact assessment methodology used by the proponent was vague and non-quantitative, and that the definitions used did not allow the Board to form useful judgements with regard to the levels of impact that were predicted.

The EIRB also cited the failure of the proponent to provide a review of the potential effects of the spill response activities on wildlife populations and resource harvesting.

The EIRB stressed the high priority attached to development of a standard and widely accepted methodology for the assessment of biological impacts that could be associated with an offshore oil spill.

2.0 SCOPE

The scope of environmental assessment for developments within the Inuvialuit Settlement Region (ISR) is prescribed by the Inuvialuit Final Agreement (IFA). The objectives of this assessment process are to recommend to the government authority competent to authorize the development, whether or not the development should proceed and, if it should, on what terms and conditions, including mitigative and remedial measures (IFA: Section 11.(24)).

The Environmental Impact Screening and Review Process as created in section 11 of the IFA has statutory status as prescribed by the Western Arctic (Inuvialuit) Claims Settlement Act (1984). The review process is distinct from other environmental assessment processes including the federal Environmental Assessment Review Process (EARP) as prescribed by the Guidelines Order (1984). Furthermore, the IFA is a land claims agreement within the meaning of subsection 35(3) of the Constitution Act (1982) regarding aboriginal rights as noted in section 3.(2) of the IFA. Section 3.(3) of the IFA establishes the paramountcy of the IFA over all federal, territorial or municipal law or any by-law or regulation. Where there is inconsistency or conflict, the IFA shall prevail.

The paramountcy of the IFA, however, does not conflict with the Guidelines Order establishing the federal EARP. Within the Inuvialuit Settlement Region both processes, the federal EARP and the Inuvialuit Screening and Review Process, exist side-by-side. In some circumstances one process can meet the legislative obligations pursuant to both Acts, and thereby avoid unnecessary duplication (IFA Section 13.(9)).

The thrust and scope of the IFA review process is clearly evidenced in section 13 of the IFA: wildlife, wildlife harvest and compensation for present and future harvest loss. In the offshore area, the Inuvialuit screening and review process is restricted, under section 11.(2) of the IFA, to the purposes wildlife compensation.

3.0 FRAMEWORK

Review by the Environmental Impact Screening Committee (EISC) is the first step in the screening and review process for an offshore project. It judges each offshore development project, as prescribed by IFA sections 11.(13) and 13.(7), on the basis of whether the project could have significant negative environmental impact in terms of wildlife harvesting and compensation. Three options are available to the EISC under section 11.(13). If the project could have significant negative impact, it is subject to further assessment and review. This would be undertaken by the Environmental Impact Review Board (EIRB) or by an alternate process as specified in IFA Section 13.(9):

> Where a proposed development is subject to environmental impact review that, in the opinion of the Screening Committee, adequately encompasses or will encompass the assessment and review function and includes or will include in its evaluation adequate terms and conditions of development and limits of liability, the Screening Committee shall refer the proposal to the body carrying out the environmental impact review.

This was done in the case of the Gulf Amauligak Extended Drilling Program (1987), which was reviewed by the Regional Environmental Review Committee.

Section 11.(24) establishes that: The EIRB shall expeditiously review all projects referred to it and on the basis of the evidence and information before it shall recommend whether or not the development should proceed and, if it should, on what terms and conditions, including mitigative and remedial measures.

The Review Board (section 13.(11)) is charged with recommending to the government authority empowered to approve the proposed development:

(a) terms and conditions relating to the mitigative and remedial measures that it considers necessary to minimize any negative impact on wildlife harvesting; and

(b) to estimate the potential liability of the developer, determined on the worst case scenario, taking into consideration the balance between economic factors, including the ability of the developer to pay, and environmental factors.

With respect to wildlife compensation (section 13.(1)), the IFA objectives are:

(a) to prevent damage to wildlife and its habitat and to avoid disruption of Inuvialuit harvesting activities by reason of development; and

(b) if damage occurs, to restore wildlife and its habitat as far as practicable to its original state and to compensate Inuvialuit hunters, trappers and fishermen for the loss of their subsistence or commercial harvesting opportunities.

Compensation, under the terms in section 13.(18), shall be for damage or loss of harvesting equipment and for any reduction in harvest or take, including the full harvest for subsistence use by the harvester and others. Inuvialuit also have the right to seek recommendations of the

Arbitration Board with respect to remedial measures, to the extent practicable, including cleanup, habitat restoration and reclamation (Section 13.(18)(c)). (Note that the interpretation of this Section is being addressed in detail by BSSC Task Group 3).

The assessment methodology for development projects, including the impacts associated with a major spill, should be compatible with and driven by the scope of the Inuvialuit Final Agreement: i.e. significant negative impacts on present or future wildlife harvesting; terms and conditions relating to mitigative and remedial measures; potential liability determined on the worst case scenario; and significant negative impact on wildlife habitat as may be interpreted from several sections in the IFA.

A working definition of Environmental Assessment in the IFA context is: the process whereby one predicts the potential direct and indirect effects of an oil spill and the impact on present and continuing harvest opportunities and/or success.

4.0 DISCUSSION

4.1 Analysis

For purposes of discussion a number of premises are put forward and supported by a brief rationale.

Premise 1: Environmental impact assessment is still a developing area of science-related decision-making.

Rationale: Impact assessment stretches well beyond the limits of "provable science" into the realm of scientific judgement. One result is that procedures and methodologies are open to persistent conceptual, theoretical and critical debate.

Premise 2: Advances in the methodologies and procedures that are best suited to impact assessments may evolve from theories and principles for decision-making, rather than from biological or environmental science *per se*.

Rationale: A complete scientific understanding of complex and dynamic interrelationships within ecosystems is impossible to obtain. Uncertainty is a persistent feature of environmental assessment, as potential but unproven relationships and consequences supersede data, information and existing knowledge bases.

Premise 3: The ideal approach is to reach agreement on a generally applicable and potentially standardized environment assessment methodology. Nonetheless, a high degree of flexibility and customizing is legitimate in order to fine tune assessment methodologies and procedures to match specific needs.

Rationale: The rights and wrongs for impact assessment are not scientifically dictated nor are they static, but are rather matters for consensus building.

Premise 4: Impact assessment for offshore developments within the ISR is done for the benefit of the people living within the Inuvialuit Settlement Region and for the public at large.

Rationale: The Environmental Impact Screening and Review Process is established and operates pursuant to the Inuvialuit Final Agreement and is specific to the settlement region and the provisions in the IFA. The focus is on wildlife harvesting opportunities. Other assessment processes, such as the Federal Environmental Assessment Review Process (EARP) and regulatory processes (e.g. Drilling Program Approvals and Authorities to Drill under the *Oil and Gas Production and Conservation Act*) are separate from, and potentially

independent of, the IFA process. To incorporate the legislative requirements of more than one Act into a single review requires recognition of this and a concerted effort and commitment by all parties.

4.2 Impact Assessment Requirements

The Beaufort Sea Region has been the subject for a succession of accelerated programs for scientific inquiry during the past seventeen years, since the first drilling offshore was approved. The budget for that scientific research and monitoring can be measured in the hundreds of millions of dollars. Each of these efforts has added significantly to the scientific knowledge base and understanding of the marine and shoreline ecosystems. Despite this progress, there continues to be an unending series of increasingly sophisticated and scientifically complex questions that can be raised as a direct result of the scientific work that has been done to date.

Scientific advances are not uniformly possible to the same extent in all areas of environmental science. Marine sciences and other science involving mobile resources are among the most difficult areas to achieve additional advances successfully. Furthermore, each new level of increasingly sophisticated environmental understanding is more costly and more difficult to achieve.

The procedures and methodologies selected for use under the Environmental Screening and Assessment Process must be adaptable in order to create the best possible match between the specific responsibilities of the Environmental Impact Review Board, the specific nature of the development proposal's potential impacts on wildlife, wildlife habitat, and wildlife harvesting and the capacity of biological and physical sciences to support scientific judgements and decision-making.

The methodology that is adopted for an impact assessment of an oil spill in the Beaufort Sea must stay within the realm of what can be evaluated effectively and credibly, given the level of scientific understanding that has been achieved. Given that total understanding is impossible, this process may appear incompatible with the quest for scientific understanding. The level of scientific understanding will influence the confidence level placed on predictions, but should not in itself determine whether or not good decisions can be made. Moreover, it should be borne in mind that the purpose of environmental assessments is not to satisfy scientists, but is instead to apply scientific judgement to the maximum extent possible towards making better decisions.

As stated in the working definition, environmental assessment in the IFA context focuses on potential impacts on present and continuing wildlife harvesting opportunities. An ecological linkage, therefore, must be tied directly to harvest.

The IFA assumes the "worst case" on which to base estimates of financial liability, but not necessarily the worst case to conduct an environmental assessment. The Environmental Impact Assessment should, in order to be realistic, assume some degree of success in mitigation (e.g. relief well capabilities, marine countermeasures, etc.). The potential success of this mitigation should be predicted by the proponent and independently assessed by the Government authority.

An environmental impact assessment methodology should allow semi-quantitative predictions to the extent possible. The methodology should also demand clear documentation or an "audit trail" of assumptions and judgements to allow any reader to evaluate the confidence in the predictions. The ongoing co-operative work undertaken for Gulf and Fisheries and Oceans and by ESL Environmental Sciences Ltd. since the Kulluk and Isserk EIRB hearings (December 1990) was cited as a promising methodology for environmental assessment of Beaufort Sea drilling.

4.3 Implementation

An environmental impact assessment methodology for oil spills in the Beaufort Sea faces several challenges. Serious concerns exist regarding possible consequences of a spill. The knowledge base, however, for anticipating the environmental effects from spills is imperfect. Actual experience with spills and the environmental effects of spills is limited to experimental exercises, surrogate information from other areas, and the few small-scale spill incidents that have occurred during routine operations. Under these conditions, the methodology must do the best job possible in terms of the development proposal per se and with regard to harvesting losses and liability.

In light of the above it is suggested that the impact assessment methodology developed by ESL Environmental Sciences Ltd. for Public Works Canada (Vonk et al; 1989) and Environment Canada (Martin et al; 1986); and later refined and adapted for Fisheries and Oceans Canada for use in their Stage III Assessment Procedures (Einstein et al; 1991), may in fact be an appropriate methodology for EIRB reviews. However, because the above methodology is being developed concurrently with the present work and because all Task Group 4 members have not had access to the information, we are unable to endorse the approach. Task Group 4 understands that the assessment methodology has three important attributes. First, it provides a systematic and semi-quantitative framework for determining potential environmental effects; second, it requires assessors to maintain an audit trail of assumptions, calculations, rationale statements and references; third, it provides consistent criteria for evaluating impacts on wildlife populations, their habitats and their harvest.

The most effective way to evaluate and improve assessment methodology is through its application to specific projects. Under this approach, the use of a methodology could be reviewed through preliminary discussions between the proponent and EIRB staff and consultants. The application of the methodology to a specific project would then provide a focus to

evaluation of the methodology by the IGC, WMAC's, FJMC, EIRB, and government agencies. The assessment methodology could then be fine-tuned to the extent necessary during the course of subsequent project reviews. This approach does put a considerable onus on the proponent to be certain that whatever methodology is used will provide the EIRB with the information it needs to carry out its review and make recommendations.

Initially, this exploratory approach may be the only realistic way to establish a stable proven methodology which is satisfactory to all parties. Any standardized methodology for both oil spill and routine activity assessments would be "scoped" and fine-tuned to the extent necessary, during the course of subsequent reviews.

Using the methodology described above as a basis, the specific assessment should be tailor-made to the extent necessary for each development proposal in order to match the project specific requirements. Agreement on the scope of the assessment for a specific project proposal should be reached by representatives from the proponent and the EIRB and its support staff, and recorded prior to a public review.

In summary, the scope of assessment review by the Environmental Impact Review Board (EIRB) is prescribed under the Inuvialuit Final Agreement. This assessment review process is not identical to either the Federal Environmental Assessment and Review Process (EARP) or regulatory decision-making processes under other federal statutes. The impact assessment methodology used should be descriptively precise, and explicit in terms of "impact" linkages. It should create a logic or "audit" trail. It should follow a standardized approach for purposes of consistency and acceptance, but each review should be tailor made to the extent necessary for each development proposal. The impact assessment methodology developed by ESL for Environment Canada and Public Works Canada and later adapted for Fisheries and Oceans Canada may be an appropriate methodology for EIRB reviews.

5.0 CONCLUSIONS AND RECOMMENDATIONS

1. The scope of impact assessments by the EIRB for offshore development is prescribed by Sections 11 (Environmental Impact and Review Process) and 13 (Wildlife Compensation) of the Inuvialuit Final Agreement. The focus is on harvesting opportunities and success. The scope is not identical to that of either the federal Environmental Assessment Review Process (EARP) or regulatory decision-making processes under other federal statutes.

2. Impact assessments for offshore developments within the Inuvialuit Settlement Region are intended to address the interests of the people living in the region and the public at large, and should be driven by the concerns that were identified during previous screenings or reviews of similar Beaufort Sea developments or of the project itself.

3. An assessment methodology should be semi-quantitative and standardized to the extent possible, and should have the following attributes: first, it should provide a systematic and semi-quantitative framework for determining potential environmental effects; second, it should provide consistent criteria for evaluating impacts on wildlife populations, their habitats, and their harvest; and third, it should compel assessors to maintain an audit trail of assumptions, calculations, rationale statements and references.

4. The impact assessment methodology originally developed by ESL Environmental Sciences Limited for Public Works Canada and Environment Canada, and later refined and adapted for the Department of Fisheries and Oceans should be further scrutinized as a potential methodology for adaptation to EIRB reviews.

5. An impact assessment methodology should be established following review of the above through discussions between the proponent and EIRB staff and consultants. Application of the methodology to a specific project will then provide the opportunity for the IGC, WMACs, FJMC, EIRB and government agencies to evaluate its effectiveness. The assessment methodology could then be fine-tuned to the extent necessary during the course of subsequent project reviews.

6. The impact assessment methodology should (as prescribed by the IFA) be aimed specifically at negative impacts on actual and future wildlife harvest loss, on mitigative and remedial measures, on the potential liability of the developer for restoring wildlife and its habitat, and on liability for compensation to Inuvialuit hunters, trappers and fishermen.

7. The impact assessment methodology should, in order to be realistic, assume that there will be some success in mitigation (e.g. relief well drilling, marine countermeasures, etc.). The potential success of this mitigation should be predicted by the proponent and independently assessed by the Government Authority.

8. Using the methodology described above as a basis, the specific assessment should be tailor-made to the extent necessary for each development proposal in order to match the project-specific requirements. Agreement on the scope of the assessment for a specific project proposal should be reached by representatives from the proponent and the EIRB and its support staff, and recorded prior to a public review.

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PART III

INFORMATION DATABASE
KULLUK RECOMMENDATION #6

Kulluk 6: An independent task force must be established to examine the research, management and funding requirements necessary to ensure that the information database is in place to facilitate environmental impact assessment and countermeasures and contingency planning, relating to an offshore oil spill in the Beaufort Sea.

1.0 BACKGROUND

The Environmental Impact Review Board (EIRB) identified information database deficiencies relating to impact assessment, countermeasures and contingency planning as one of the factors contributing to its decision to recommend that the Kulluk drilling program not be approved (Public Review of the Gulf Resources Ltd. Kulluk Drilling Program 1990-1992; June 28, 1990; 66 pp). The specific recommendation from the Kulluk review is presented verbatim above.

The EIRB further suggested (Kulluk 2) that all oil spill contingency plans should include oil spill countermeasure plans, oil spill clean-up plans and oil spill related wildlife protection plans.

The EIRB in its Kulluk report cited examples of missing information as follows:

- identification of sensitive areas;
- protection plans for particularly sensitive species;
- plans for shoreline protection and clean-up;

- remedial measures designed to protect valuable wildlife likely to be exposed to oil;
- the extent to which (these wildlife) would be sensitive to this exposure;
- the ability to identify priorities in protection efforts; equipment and support required;
- effects of a spill response on wildlife populations and resource harvesting.

In making its recommendation, the EIRB challenged the proponent "that, according to Gulf, there does not exist a reliable body of information to enable it to provide the Board with any estimates, assumptions, models, or data on the crucial areas of shoreline impacts, shoreline response, and clean-up standards". The EIRB stated that "certainly such information did exist at the time of the 1980 Beaufort Environmental Assessment Review Panel and recommendations were made, at that time, with respect to accumulating updated information on an ongoing basis".

The EIRB concluded that "there is, based on the evidence and information presented at this Public Review, an urgent need to develop an up-to-date database to support oil spill assessment, countermeasures and contingency planning".

2.0 SCOPE

The scope of the information database requirements should be viewed in the context of the Inuvialuit Final Agreement (IFA). The scope of the EIRB review of an offshore drilling program is prescribed by sections 11 and 13 of the IFA.

Section 3.(3) of the IFA establishes the paramountcy of the IFA over all federal, territorial or municipal law where there is inconsistency or conflict. The paramountcy of the IFA, however, does not conflict with impact assessments required under the federal Environmental Assessment Process (EARP) Guidelines Order, and regulatory reviews under the Oil and Gas Production and Conservation Act.

The EIRB is mandated to review projects that could have a significant negative environmental impact within the Inuvialuit Settlement Region (ISR). In the offshore portions of the ISR, the EIRB mandate is restricted, under section 11.(2) of the IFA, to the purposes of wildlife compensation.

Section 11.(24) establishes that the EIRB shall expeditiously review all projects referred to it and on the basis of the evidence and information before it shall recommend whether or not the development should proceed and, if it should, on what terms and conditions, including mitigative and remedial measures.

Section 13.(11) charges the EIRB to recommend to the government authority empowered to approve the proposed development:

(a) terms and conditions relating to the mitigative and remedial measures that it considers necessary to minimize any negative impact on wildlife harvesting; and

(b) an estimate of the potential liability of the developer, determined on a worst case scenario, taking into consideration the balance between economic factors, including the ability of the developer to pay, and environmental factors.

Using the Inuvialuit Final Agreement (IFA) as the frame of reference, the information database should apply to:

- restoring wildlife and its habitat as far as is practicable to its original state and to compensating Inuvialuit hunters, trappers and fishermen for the loss of their subsistence or commercial harvesting opportunities (Section 13.(1)(b));

- environmental protection measures that are designed to reduce future harvest loss (Section 13.(4));

- terms and conditions relating to the mitigative and remedial measures... necessary to minimize any negative impact on wildlife harvesting (Section 13.(11)(a)); and

- ....a significant negative impact on wildlife habitat or on present or future wildlife harvesting (Section 13.(12)).

The Review Board also will make its conclusions and recommendations on the basis of the information and evidence before it. Hence, any omissions or failure to provide information and evidence, regardless of the extent to which it may exist elsewhere, could influence the Review Board's recommendations. The importance of this caveat is supported by the phrasing of the EIRB review of the Kulluk proposed drilling program that "there is, based on the evidence and information presented at the Public Review, an urgent need to develop an up-to-date database to support oilspill assessment, countermeasures and contingency planning" (see also Background, Section 1.0).

3.0 FRAMEWORK

The focus of the present work was on:

I. determining the status of the information database necessary for the purposes of environmental assessment of oil spills and contingency planning (as defined by the EIRB Kulluk Recommendation #2 as countermeasures, clean-up and wildlife protection); and

II. determining the sufficiency of existing databases to enable the EIRB to review offshore drilling proposals relative to its IFA mandate (i.e. wildlife harvesting and compensation as specified in the IFA Sections 11 and 13).

In undertaking the two major tasks above, the following tasks were also identified as important:

- determining what is actually needed and what can be done with the information on hand, rather than on simply identifying data gaps as the end point of a line of inquiry i.e. the question is what do we need rather than what do we not know;

- categorizing database needs identified by the EIRB into those which are obtainable now and those which can only be obtained as a result of a scientific response to an actual oil spill.

In order to focus the discussion on whether the information database is sufficient, Task Group 4 undertook two fundamental steps:

- Step 1 was to reach a common understanding on what is being discussed by developing a set of definitions (section 4.0); and

- Step 2 was to develop a matrix framework to guide the discussion and to categorize the information database needs (Table 1).

4.0 DEFINITIONS

The following definitions were developed for the present Task Group 4 exercise:

Contingency Plan
should include oil spill countermeasures plan; oil spill clean-up plans; and oil spill related wildlife protection plans (after EIRB; Kulluk 2).

Marine Countermeasures Plan

the containment and recovery of "mobile" oil on water and the protection of shoreline areas; including ice edges, leads, etc.

Shoreline Clean-up Plan

the removal, recovery and disposal of oil from shorelines and intertidal areas after it is no longer mobile.

Wildlife

Wildlife is as specified by the Inuvialuit Final Agreement.

Wildlife Protection Plan

wildlife protection plan should include a consideration of deterrents and relocation + habitat protection + cleaning and treating of oiled wildlife.

Wildlife Habitat Restoration

restoration is the accelerated functional return of habitat to pre-spill or normal state to the extent practicable.

Environmental Assessment (in the IFA context)

The process whereby one predicts the potential direct and indirect effects of an oil spill and the impact on present and continuing harvest opportunities and/or success.

Table 1: Information Database Needs Matrix*

The following table was developed to focus the discussion on what we need to know and on whether the information database is sufficient.

	CONTINGENCY PLAN (1)			(2)	(3)
	Marine Counter-measures Plan (1.1)	Shoreline Clean-up Plan (1.2)	Wildlife Protection Plan (1.3)	Wildlife Habitat Restoration	Environmental Impact Assessment
HARVEST					
MAMMALS					
BIRDS					
FISH					

* For each box, the following questions are asked and decisions made.

1. What do we need to know and why?

2. Is there adequate information? If not, what essential information is missing?

3. If missing and essential, what should/can be done to provide information? The following decisions should then be made:

   . acquire the new information;
   . use a surrogate; or
   . not possible to acquire the information (too poor a chance of success, too expensive, etc.).

5.0 DISCUSSION

An adequate information database must be available to allow informed assessment and contingency planning. This information base is the foundation for the entire review process as stipulated in the Inuvialuit Final Agreement. The task here is to evaluate the adequacy of that database.

5.1 Analysis

For purposes of discussion, a number of premises are put forward and supported by a brief rationale.

Premise 1: The EIRB review process is still relatively new and unfamiliar. As a result, perceptions to match the unique scope of the reviews are not solidly entrenched.

Rationale: More experience with the EIRB review process will help to establish clearer and firmer concepts of what to expect among the participants, including industry and government. This can be expedited through continuing scoping sessions and agreements between the participants and the EIRB staff and consultants.

Premise 2: In the absence of a fully developed assessment framework, environmental reviews tend to search for gaps in information as the end points for a line of inquiry, and to focus on what is "missing" more than on what is actually needed or what can be done with the information on hand.

Rationale: A thorough and consistent line of questioning ends when it reaches a point where there are no answers. This situation should not be equated on an a priori basis to there being insufficient information.

Premise 3: Information that may appear logically necessary also may be scientifically unattainable at a reasonable cost or over a practical period of time.

Rationale: There will always be a surplus of reasonable and relevant scientific questions during environmental reviews relative to the ability of scientific information databases to provide conclusive, scientifically sound answers.

Premise 4: In the absence of a major oil spill in the Beaufort Sea, many ecological linkages (i.e. impact hypotheses) will remain untested and speculative.

Rationale: Much of the data that would be useful to decision-making, if it were available, can be obtained only should oil spills occur. In order to capitalize on any "spill of opportunity", a research response must be developed to the maximum extent possible prior to a spill occurring (see also Task Group 4 Final Report on Isserk Recommendation #5).

Premise 5: Environmental monitoring is integral to any research program.

Rationale: Monitoring will be critical for: predicting the potential impacts of an oil spill and selecting practical clean-up and restoration techniques; evaluating the effects and effectiveness of those techniques; and determining an end point for clean-up, restoration and compensation.

Premise 6: We should not rely on the information database from the Exxon Valdez spill to address all of our needs.

Rationale: Although there is and will continue to be some worthwhile data forthcoming from the Exxon Valdez spill, its transferability may be limited because of the different environment, climate and beach types involved. There was apparently little experience gained in discriminating between the impacts of the oil and the impacts of the countermeasures and clean-up measures themselves. Availability of that information is further compromised by litigation in the courts which could withhold some information for several years.

5.2 History and Context

The Beaufort Sea has been under intense study by physical and biological scientists for nearly twenty years, particularly since the first offshore drilling activity for hydrocarbons was given approval in principle in 1974. Hundreds of millions of dollars have been spent by industry and government conducting baseline and other studies on virtually every aspect of the Beaufort Sea environment (Croasdale, 1990; DIAND, 1985; 1990; Seakem et al, in prep; LGL et al, 1987; NOGAP, 1989). The early efforts culminated in 1982 with the submission of an environmental impact statement on all aspects of hydrocarbon development, production and transportation for review by an environmental assessment panel (Dome et al; 1982).

There is no single compilation of all research and monitoring conducted in the Beaufort Sea Area. There are, however, summaries of specific programs which can provide us with an indication of the level of effort expended to date. For example, an ongoing ten year old initiative by Fisheries and Oceans Canada, the Arctic Data Compilation and Appraisal Program (ADCAP) has catalogued, mapped and appraised all 19th and 20th century field studies of seals, whales, fish, benthos, bacteria, plankton, nutrients, hydrocarbons, heavy metals, waves, etc. in the Beaufort Sea and other arctic regions.

The prominence of concern over oil spills was increased substantially as a result of the March 1989 Exxon Valdez spill in Prince William Sound in Alaska. This well-publicized spill followed closely on the December 1988 Nestucca spill which affected the West Coast of Vancouver Island. Appointment of the Brander-Smith Panel on Tanker Safety and Oil Spill Response followed shortly thereafter. This Canadian Panel held public hearings in five communities across the North, including Inuvik. Although the spills and subsequent reviews related to shipping, these events raised public consciousness and concern over all marine oil spills, including possibilities of an uncontrolled release of oil during drilling operations in the Beaufort Sea.

The images from the Exxon Valdez are etched in the memories of many people. As long as these images remain in place, offshore exploration activities in the Beaufort Sea will encounter serious concerns over the possibility, however improbable, of major oilspill. It is perhaps in this context that the recommendation from the Environmental Impact Review Board must be addressed.

5.3 Database Requirements

Data requirements might be broadly categorized by discipline as engineering, environmental, social and cultural. They are very diverse, ranging from oil characteristics and efficiencies of in situ oil burning, to overwintering habitat of anadromous fish or harvest statistics.

For purposes of discussion, the range of EIRB database requirements can be considered under two broad categories; baseline data and process information:

Baseline Data can be considered as the most basic information on "what is where". Opportunities to collect baseline data are virtually limitless. In order to be useful, however, baseline data must be collected for some purpose that is linked to planning, to being better

prepared to carry out a spill response, and/or to undertaking a scientific response should a spill occur. When dealing with baseline data, it is necessary to question why the data are needed and what uses will be made of these data?

Process information is necessary to bridge the distance between baseline data and the predicted effects of an oil spill. During contingency planning, for example, the predicted behaviour of oil under the specific weather conditions is vital information: e.g. evaporation, emulsification, behaviour in and under ice, etc. Information on the use of countermeasures and their effectiveness including all opportunities for controlling the spread of oil, and recovering and removing spilled oil from the marine environment is at the core of contingency planning.

Impact assessment should be tied directly to the effects of oil on harvested wildlife, wildlife habitat and wildlife harvesting. A range of process information is needed to analyze these impacts. Also required is information on both the effectiveness and impacts of cleanup techniques, mitigative and remedial measures, and restoration techniques.

The work of Task Group 4 cannot be done in isolation of the six other BSSC Task Groups. The potential database needs have been identified in terms of the various Task Groups under the Beaufort Sea Steering Committee (Annex 1). The list of items does not represent a database as such, but identifies broad categories useful to identify information needs related to an offshore oil spill in the Beaufort Sea. The results of the other Task Groups must be reviewed in some detail from the perspective of these information needs. This has been initiated here, but cannot be completed without all of the completed Task Group reports.

5.4 Sufficiency of the Information Database

The following is a cursory appraisal of the sufficiency of the existing database to allow the EIRB to make informed recommendations.

Contingency Planning

Marine Countermeasures Plan

Information requirements on countermeasures can best be discussed under 3 categories: effects; effectiveness; and logistics (availability and deployment). The first priority of effects information required is the vulnerability and sensitivity of species, both to oil and to the countermeasures techniques. However, the requirement for this information is in a relative sense (i.e. species vs. species) to allow informed priorization of countermeasures techniques and application. Consequently, a lower level of information is required for countermeasures than that required for environmental impact assessment.

From a marine countermeasures perspective, the information database is probably sufficient to allow informed decision making with respect to all wildlife species, and no critical information need is identified.

Nevertheless, there are several opportunities and secondary considerations which will be reported in further detail in the Summary of the January 17-18 Workshop as a component of the Beaufort Region Environmental Assessment and Monitoring (BREAM) 1990/91 Report (in preparation).

The following are general comments related to marine countermeasures information needs:

Marine countermeasures information is required primarily as the means for setting priorities for countermeasures response. Given that decisions on the selection of countermeasures are made quickly and often

with a limited amount of information on hand, it is advisable that a framework be developed and in place prior to a spill to facilitate this decision making process.

There have been numerous investigations of the effects of countermeasures (including chemical dispersants), and this surrogate information is generally transferable to the Beaufort Sea. Nonetheless, there is a recognition that there may not be sufficient regional information in all cases to justify public policy and particularly to justify a measured or limited response. This should be considered in determining sufficiency of the information database.

Clean-up

Discussion centers inevitably (and as evidenced in the work of several other BSSC Task Groups) on whether we have sufficient information to determine the net environmental effect of various clean-up techniques, and enough information to make the decision of "how clean is clean". It is fair, but not particularly helpful, to state that priorities for clean-up will be assigned based on political, socio-economic, scientific and logistic considerations; oil will be cleaned up so long as there is a net benefit in doing so. The question of "how clean is clean" remains an important and unresolved issue which requires further consideration and should be addressed in a separate forum (see also BSSC Task Group Final Reports 1 and 2).

The database is available to set priorities for critical areas of harvested and sensitive species such as polar bears and birds. The information contained in the Beaufort Sea Oil Spill Atlas (Dickins et al; 1987) is being augmented now by valuable additional work by Ed Owens designed to set priorities and discuss logistics and personnel requirements for clean-up of the Beaufort Sea shoreline. Taken together, these will address many of the concerns related to clean-up preparedness.

It is agreed that there is a general scarcity of information on the effects of clean-up techniques and that such data collection should receive high priority when the opportunity presents itself (i.e. spills of opportunity). This should be identified as part of a scientific spill response plan which priorizes the information to be collected following a spill of opportunity. (Refer also to the Task Group 4 Report on Isserk Recommendation 5).

Virtually all of the information needs identified cannot be obtained without an actual oil spill. This leaves two options: opportunistic studies conducted during the scientific response to a spill; or an experimental oil spill. The latter option was considered viable and worthy of further consideration, but was not addressed here in any detail.

Wildlife Protection Plans

The priority of the implementation of the elements of any plan should be to: a) deter; b) protect and c) clean.

a) Deterrents

The information need for deterring wildlife species is not great for a number of reasons: considerable information is available (polar bears, caribou); deterrent techniques may be impractical because of the species distribution and habits (seals); or the overall population is not considered highly vulnerable to oil (whales, arctic foxes). Although deterrents could in some cases be used on these species, it was concluded that the priority for obtaining additional information is not high.

The information database on deterring birds in the Beaufort Sea is limited and surrogate information from elsewhere should be reviewed and summarized in terms of success and effectiveness in the Beaufort Sea. The ongoing ESRF funded study will help to determine if field testing of bird deterrent techniques in the Beaufort Sea is warranted.

b) Protection of Habitat

Considerable attention has been paid to identifying priority areas for clean-up and the database is generally adequate (e.g. Dickens et al 1987; ongoing work of Ed Owens). However, an information need is identified with respect to the location of both "permanent and temporary" waste storage sites. Efforts should be made to expand the criteria for the selection of sites to include not only physical criteria (e.g. topography, protection from storm surges, permafrost distribution) but also logistics (e.g. access to pickup) and socio-economics. This would assist teams who must make real-time decisions in the event of a spill, such as the Spill Clean-up and Assessment Teams (SCAT) employed following the Exxon Valdez spill.

c) Cleaning and Treating of Oiled Individuals

This was considered an issue primarily for birds and bears. The information database for birds is large and sufficient, although there is some value in re-examining the transferability of information from other areas. There is an opportunity to improve the database for polar bears (and grizzly bears) through relatively simple and non-controversial testing of the effectiveness of cleaning agents on bear pelts.

Wildlife Habitat Restoration

Note that this issue is addressed in considerable detail in the BSSC Task Group 2 Final Report (M. Lawrence, 1991).

The existing information database on the effects and effectiveness of restoration techniques (e.g. bioremediation, revegetation, habitat enhancement) is poor. In the event of a spill, collection of this information should receive a high priority.

In the IFA context, the restoration requirement is to "return the habit as far as practicable to its original state". Restoration could be used to accelerate natural recovery and to achieve productive capability. There is considerable basic ecology information available to measure such recovery but it is neither practical, nor financially realistic, to determine the existing productive capacity of Beaufort Sea coastal habitats. It may be possible, however, to focus on the reproductive capacity of the two most important species from a harvesting perspective (polar bears and beluga) and/or to focus on key or indicator species (e.g. red throated loons).

The Beaufort Region Environmental Assessment and Monitoring (BREAM) program could be used to determine the ecological information database necessary to predict and measure restoration success. The BREAM program could also use the hypotheses/linkage approach as a means of determining what ecological information is sufficient and what new information is necessary.

Environmental Impact Assessment

Note that the issue of environmental assessment methodology is addressed in further detail in the Task Group 4 Final Report on Kulluk Recommendation #7. Some key points follow:

The information database required for environmental assessment (EA) is generally more comprehensive and more detailed than that required for effective contingency planning or restoration. As stated in the definition, environmental assessment in the IFA context focuses on

potential impacts on present and continuing wildlife harvesting opportunities. Any ecological linkage, therefore, must be tied directly to harvest.

The IFA assumes the "worst case" on which to base estimates of financial liability. However, the environmental assessment should, in order to be realistic, assume some degree of success in mitigation (e.g. relief well capabilities, marine countermeasures, etc.). The potential success of this mitigation should be predicted by the proponent and independently assessed by the Government authority.

Any environmental assessment methodology should allow semi-quantitative predictions to the extent possible. The methodology should also demand clear documentation or an "audit trail" of assumptions and judgements. The ongoing work undertaken co-operatively for Gulf and Fisheries and Oceans by ESL Environmental Sciences Ltd. since the Kulluk and Isserk EIRB hearings is noted as a promising methodology which allows the "expert" to better document and quantify predictions.

There should be a conscious change in focus towards what are bonafide data needs as opposed to weak links and data gaps. The latter cycle can be endless in that regardless of the sufficiency of the information, there will always be weak links. The focus, therefore, should shift from what we don't know to what we need to know.

The present group is able to recommend "candidates" for further research (See also BREAM 1991 Report, in preparation). These candidates should be further assessed and refined in a process which uses impact hypotheses, linkages and a more rigorous and detailed determination of the adequacy of existing information. The Beaufort Environmental Monitoring Program (BEMP) was successful in this task but did not consider the catastrophic oil spill scenario; this task should be undertaken through the successor to BEMP, the Beaufort Region Environmental Assessment and Monitoring (BREAM) Program.

A precursor to the BREAM workshop approach is to develop a "super table" which identifies the sensitivity and vulnerability of all wildlife species or species groups identified in Dickens et al (1987). The table should also include the state of the biological database and include information on the species distribution and abundance as well as reproductive capacity. It should also be accompanied by a detailed audit trail.

(Note that this has been initiated by the BSSC Task Group 2 (Lawrence et al, 1991).

5.5 Implementation

The options for ensuring that the information database exists, to the extent that it is practicable, for offshore oil spills is primarily a matter of expertise, time and money. Individual petroleum companies and on-going government programs are obvious options as are special administrative arrangements which pool interests, such as the Environmental Studies Research Fund (ESRF). The federal government also has two specially ear-marked programs, the Panel on Energy Research and Development (PERD) and the Northern Oil and Gas Action Program (NOGAP), which can support activities relating to information database development. The process for ensuring that such programs direct their limited resources towards developing the most useful information database should be revisited, based in part on the results of the BSSC. The results from this analysis should also be dovetailed with the Isserk 5 recommendations, and be incorporated into efforts by industry and government to ensure that "the information database is in place to facilitate environmental impact assessment and countermeasures and contingency planning" for future reviews by the Environmental Impact Review Board and government.

6.0 CONCLUSIONS AND RECOMMENDATIONS

1. Task Group 4 supports the EIRB concept that an adequate information database needs to be available since this is the very foundation for the entire review process as stipulated in the Inuvialuit Final Agreement. This database is necessary for the purposes of environmental prediction and assessment of oil spill scenarios and for contingency planning (as defined by the EIRB as marine countermeasures, clean-up and wildlife protection).

2. The Beaufort Sea area has been under intense study by physical and biological scientists for nearly twenty years. Hundreds of millions of dollars have been spent by industry and government conducting baseline and other studies on virtually every aspect of the Beaufort Sea environment. The present information database is extensive and comprehensive.

3. The EIRB will base its decisions and recommendations on the information and evidence before it. The proponent and government must be diligent in bringing all relevant information before the Board.

4. In the absence of a catastrophic oil spill offshore in the Beaufort Sea many impact hypotheses will, by necessity, remain untested. This information, which can only be obtained following a major spill, forms the bulk of the "missing or inadequate" information database. To capitalize on any "spill of opportunity" a research response should be developed to the maximum extent possible prior to a spill occurring (see Task Group 4 Final Report on Isserk Recommendation #5).

5. There will always be a surplus of reasonable scientific questions raised during environmental reviews relative to the ability of scientific information database to provide conclusive, scientific sound answers. There must, therefore, be a change in focus towards what are bonafide needs as opposed to weak links or data gaps; the focus must shift from what we don't know to what we need to know.

6. The present work includes a set of definitions, a matrix framework and tables which are useful tools towards determining the status and the adequacy of the existing information database. It also identifies opportunities for gathering the type and quality of data necessary to allow informed recommendations by the EIRB. This structured approach should be refined and applied on an iterative basis towards directing research and monitoring efforts.

7. The "candidates" for further research and monitoring identified by Task Group 4 should be further assessed and refined in a process which uses impact hypotheses, linkages and a more rigorous interpretation and determination of the adequacy of existing information. The Beaufort Environmental Monitoring Program (BEMP) was successful in this task but did not consider the catastrophic oil spill; this should be undertaken by the successor to BEMP, the Beaufort Region Environmental Assessment and Monitoring (BREAM) Program, which is being initiated by DIAND, DOE and DFO as a planning component of the Northern Oil and Gas Action Program (NOGAP).

Annex 1: Categories of Information Database Needs Listed by BSSC Task Groups

I. Task Group One: Worst Case Scenario Procedure and Cost

marine countermeasures
- oil detection, tracking and trajectory models (effectiveness)
- oil behaviour under spill conditions (distribution, fate, recovery)
- oil containment and recovery (effectiveness and cost)
- oil handling, storage and disposal (techniques and cost)

shoreline cleanup
- beach characterization
- priorities for protection and cleanup (wildlife distributions)
- cleanup techniques (effectiveness, impacts, and cost)
- waste handling, storage, disposal, and cost
- oil fate and persistence

II. Task Group Two: Wildlife and Habitat Remediation, Mitigation and Restoration

harvesting compensation (also Task Group 3)
- direct losses resulting in reduced present and future harvests
  - mortality in harvested populations
  - disturbance/displacement of populations during harvests
  - loss of access for harvesting
- indirect losses
  - mortality amongst prey species, reducing harvested populations and lowering sustainable harvest
  - loss of limiting habitat through destruction, disturbance during cleanup, lessened productivity through contaminations reducing harvested populations and lowering sustainable harvest
  - sublethal effects reducing future recruitment amongst harvested populations (sustainable harvest - compensation) and prey species (restoration and reduced sustainable harvest)

mitigation and restoration of wildlife and wildlife habitat (and cost)

Annex 1 (continued)

III. Task Group Three: Compensation and Financial Liability

harvesting compensation
current harvest loss
- mortality (sustainable harvest)
- displacement (harvesting costs)
- access (harvest levels/costs)

future harvest loss
- reduced populations and/or recruitment (sustainable harvests)
- displacement, avoidance and access (cost of harvest/harvest levels)

IV. Task Group Five: Approval of Contingency Plans including countermeasure plans, cleanup plans and wildlife protection plans.

Note: Task Group Five is dealing with an "administrative analysis" of the recommendations put forward by the EIRB in its Kulluk report.

marine countermeasures
oil detection, tracking and trajectory models
oil behaviour under spill conditions
oil containment and recovery
oil handling, storage and disposal/transportation techniques

shoreline cleanup
beach characterization
beach protection and cleanup priorities
cleanup techniques
waste handling, storage and disposal

wildlife protection plan
wildlife distribution and abundance
harvesting locations, timing and access routes
priorities and strategies for oil exclusion
wildlife displacement (deterrent) techniques
wildlife cleaning and treatment techniques and facilities
restoration of habitats and wildlife populations

V. Task Group Six: Methodology/Procedure for Setting Safe Operating Season and Cut-off Date for Risk Drilling

operating Environment
ice conditions: strength, physical stresses-movement and density
sea state: winds, waves and storms
temperatures: freezing spray, etc. affecting operations
visibility: fog, storms

well control
gas-oil ratios
BOPD rates
bridging potential

APPENDIX #1
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APPENDIX II

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