Cumulative Effects Assessments in the Inuvialuit Settlement Region: A Guide for Proponents

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Prepared for:

The Environmental Impact Screening Committee

and

The Environmental Impact Review Board

EIRB

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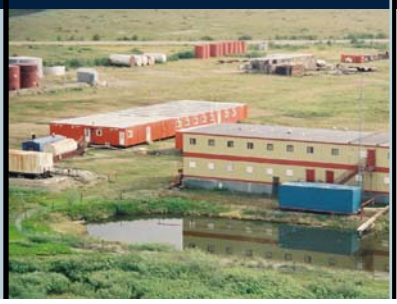

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Preface

Applicants for authorizations to undertake activities in the Inuvialuit Settlement Region need to understand the priority that Inuvialuit place on environmental issues. Applicants also need to understand the importance of consulting with the Inuvialuit and their institutions to ensure that mitigation of project effects is state-of-the-art.

The *Inuvialuit Final Agreement* (IFA), dated June 5, 1984, settled the land claim of the Inuvialuit in the Western Arctic Region of Canada. This agreement was "approved, given effect and declared valid" by Section 3(1) of the *Western Arctic (Inuvialuit) Claims Settlement Act*, being Chapter 24, 32-33, Elizabeth II of the Statutes of Canada.

The Act further provided in Section 3(2) that the beneficiaries under the Agreement "shall have the rights, privileges and benefits set out in the Agreement", and in Section 4 that the provisions of the Act and the of the Agreement will prevail over any other law applying to the Territory in the event of inconsistency or conflict.

Being a land claims settlement within the meaning of Section 35 of the *Constitution Act*, 1982, the Agreement is thereby affirmed as an existing aboriginal right. In consequence of these statutory provisions, the terms of the Agreement are given a preferred status over all other federal and territorial laws within the defined Inuvialuit Settlement Region in the Western Arctic.

The Inuvialuit negotiated the IFA to avoid repeating the experience of the late 1970s when they felt sidelined by the proponents of development in the Mackenzie Delta. As project descriptions come forward for renewed activity in the Inuvialuit Settlement Region, institutions established by the IFA will exercise their mandates in pursuit of the goals specified by the IFA, namely:

- to preserve Inuvialuit cultural identity and values within a changing northern society
- to enable Inuvialuit to be equal and meaningful participants in the northern and national economy and society
- to protect and preserve the Arctic wildlife, environment and biological productivity.

Inuvialuit participate in development economically as well as through co-management of fish and wildlife and in review of project descriptions. The Inuvialuit have expressed their interest in having resource development proceed by consenting to the issuance of exploration rights by the Crown and by the Inuvialuit Regional Council. They are, however, equally determined to ensure that development will not occur at a long-term cost to the land that has sustained their well being for generations. Wise stewardship of the land is central to the vision that Inuvialuit have for the future landscapes of the Inuvialuit Settlement Region.

The most important thing that we have is our land and waters and because we have looked after them, they have supported us for many generations and if we continue to ensure they are cared for – they will support us for many generations to come.

Billy Day (Inuvialuit Elder) 1993

Authorship

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Executive Summary

This document has been prepared as a guide for companies that are required to conduct cumulative effects assessments (CEAs) as part of the project descriptions they submit for their proposed developments in the Inuvialuit Settlement Region (hereafter referred to as the ISR). This Proponent's Guide has been prepared for the Environmental Impact Screening Committee and the Environmental Impact Review Board by KAVIK-AXYS Inc. A Reviewer's Guide has also been prepared that provides guidance on how CEAs for screening applications and environmental impact statements (EISs) should be reviewed and evaluated by the Environmental Impact Steering Committee (EISC) and the Environmental Impact Review Board (EIRB).

This Proponent's Guide summarizes the information that should be provided by proponents in their applications, comments on best practice, reviews the steps in the assessment process, identifies opportunities to manage effects and discusses the evaluation of significance. This Guide will help proponents understand the expectations of the EISC and the EIRB with respect to CEA and management, and the importance of CEA in helping fulfill the objectives of the Inuvialuit Final Agreement as the agreement relates to wise stewardship. The Guide will help proponents better understand the minimum information requirements and approaches for CEA within the ISR, thereby promoting greater consistency among different submissions relative to the scale and amount of detail for CEA.

Technical specialists who are responsible for conducting environmental impact assessments in the ISR on behalf of proponents are encouraged to refer to both Guides while they carry out their work. The Reviewer's Guide outlines the basis for the review of the assessment done by the proponent. This information can be just as important for proponents as understanding how to complete an assessment.

This Guide is an early step in the improvement of the quality and capacity for CEA on projects in the ISR. By encouraging a high standard of CEA and by focussing the review of these results, the practice of CEA will improve.

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Abbreviations

BMMDA ..... Beaufort-Mackenzie Mineral Development Area
CCP ..... community conservation plan
CCME ..... Canadian Council of Ministers of the Environment
CEA ..... cumulative effects assessment
CEAA ..... *Canadian Environmental Assessment Act*
EIA ..... environmental impact assessment
EIRB ..... Environmental Impact Review Board
EIS ..... Environmental Impact Statement
EISC ..... Environmental Impact Screening Committee
EISRP ..... environmental impact screening and review process
EMS ..... environmental management system
FJMC ..... Fisheries Joint Management Committee
GNWT ..... Government of the Northwest Territories
HTC ..... Hunters' and Trappers' Committee
IFA ..... *Inuvialuit Final Agreement*
IGC ..... Inuvialuit Game Council
ILA ..... Inuvialuit Land Administration
INAC ..... Indian and Northern Affairs Canada
ISR ..... Inuvialuit Settlement Region
IUCN ..... International Union for the Conservation of Nature
LRTAP ..... Long Range Transport of Air Pollutants
MDOG ..... Mackenzie Delta Operators' Group
NEB ..... National Energy Board
NRTEE ..... National Round Table on the Environment and Economy
NS ..... North Slope
NWT ..... Northwest Territories
POP ..... Persistent Organic Pollutant
RoW ..... right-of-way
RWED ..... Department of Resources, Wildlife and Economic Development
TK ..... Traditional Knowledge
VEC ..... valued ecosystem component
WMAC ..... Wildlife Management Advisory Council
ZOI ..... zones of influence

1 Introduction

1.1 What is the purpose of this Guide?

Purpose of Guide

The purpose of this Guide is to assist the proponent of a development in the Inuvialuit Settlement Region (hereafter referred to as the ISR) in their assessment of the potential contribution of a project to cumulative environmental effects. The assessment of cumulative effects is an important component of the environmental impact screening and review process (EISRP) under the terms of the *Inuvialuit Final Agreement* (IFA).

Growth of interest in oil and gas resources

With the revival of interest in the hydrocarbon resource potential of the Mackenzie Delta-Beaufort Sea, there is an increasing number of applications for authorization of activities on lands within the ISR. This has given rise to growing concern among communities and agencies for the potential for cumulative environmental effects, in particular on wildlife, wildlife habitat and wildlife harvesting; and, a need to have a clear understanding of the contribution to these effects by individual projects.

Objectives of Guide

This Guide was developed at the request of the Environmental Impact Screening Committee (EISC) and the Environmental Impact Review Board (EIRB) to help clarify for the proponent the concept and practice of cumulative effects assessment (CEA). It is intended to assist a proponent in addressing the potential for their project to contribute to cumulative environmental effects, and to meet the requirements of the EISRP under the IFA. The Guide also will help proponents identify measures to manage and mitigate these effects.

1.2 Why should a CEA be completed?

Assessing cumulative effects as a decision-making tool

The Inuvialuit are committed to the development of a balanced economy where traditional land uses and the ecosystems that support these uses can be maintained in perpetuity, while also permitting industrial and community development. The EISRP, and in particular the requirement for CEA, is one of the major tools for helping to ensure the wise stewardship of natural resources.

Proponents are required to assess cumulative effects as part of the project description that they submit to the EISC or as part of the environmental impact assessment (EIA) if a review by the EIRB may be required. In short, the completion of a CEA is a requirement for almost all kinds of projects.

Level of effort

The proponent determines the appropriate level of detail and effort to be applied to CEA, and to other aspects of the EIA required for a project description (for EISC) or Environmental Impact Statement (EIS) (for EIRB). The effort applied should be in proportion to the potential of the project to create negative environmental impacts, in this case negative cumulative environmental impacts. This judgement call can be difficult. A thorough job of scoping and consultation with local communities will be important to ensuring an appropriate allocation of resources and effort to both EIA and CEA.

Benefits

Effective assessment and management of cumulative effects can also be good business; specifically:

- **Help build strong positive relationships:** The process of CEA can help build strong relationships with the people in the ISR. Some industrial developments in the ISR will span decades. Therefore, the building and maintenance of strong ties with people in the ISR will be an important foundation for project success. By demonstrating a real interest in assessing and managing cumulative effects from their project, proponents can demonstrate support for the long-term objectives of the Inuvialuit.
- **Save money:** Alterations in project design or specific measures to reduce or eliminate the potential for cumulative effects may reduce the planning and development costs for a project (e.g., sharing of access roads).
- **Avoid adverse publicity:** Development of oil and gas reserves and mines in the north has attracted considerable public attention. Proponents who do not manage cumulative effects and project effects may well attract adverse publicity at a national or international scale.
- **Smooth approval processes:** Failure to address cumulative effects well and demonstrate how potential effects will be managed can result in deficiencies in a project description or EIS resulting in the need to file additional information. Deficiencies may also lead to lengthy hearing processes, complications with project approvals (e.g., conditions on permits or licenses) or legal challenges and interventions.
- **Increase certainty about land use:** By demonstrating an ability to conduct activities in an environmentally sustainable fashion within the ISR, operators can gain support for multiple projects.
- **Improve environmental performance:** Many corporations have committed to sustainable development through their environmental policies. Effective management of cumulative effects and project-specific effects is a cornerstone for such policies.

1.3 Who should read this Guide?

The main audience for this Guide is the prospective proponents of developments either within the ISR, or outside the ISR but whose projects are likely to have impacts on the ISR. Under current environmental assessment practices in the ISR, both pursuant to the IFA and to the *Canadian Environmental Assessment Act* (CEAA), it is the task of the proponent to develop the EIA of a project upon which are made the environmental screening and review decisions (under the IFA) and environmental assessment (under CEAA).

1.4 How should this Guide be used?

The Guide describes a "best practices" approach to the assessment of a project's potential contribution to cumulative environmental effects. The guidelines described here parallel the guidelines for review and evaluation of an application from a proponent by the EISC and EIRB. By making sure that the required information to the EISC or EIRB is complete, the proponent can ensure that their application is reviewed expeditiously.

1.4.1 Other guidance in the ISR

Inuvialuit

The authorities for the implementation of the IFA EISRP are the EISC and the EIRB, based in Inuvik, Northwest Territories. The procedures through which these institutions conduct their mandate are outlined in public guidelines documents that are revised from time to time. The following guidelines set out the requirements for proponents and the expectations of the EISC and EIRB regarding the content and standard of project descriptions submitted for screening and review[1]:

- *Environmental Impact Screening Committee Operating Guidelines and Procedures* (February 1999)
- *Environmental Impact Review Board Operating Procedures* (June 2001).

The proponent may contact the Joint Secretariat for the EISC or EIRB to obtain copies of these documents (phone: 867-777-2828; fax: 867-777-2610; email: eisc@jointsec.nt.ca or eirb@jointsec.net.ca). The proponent can also contact the secretary for the EISC or the secretary for the EIRB at the Joint Secretariat to seek advice on process and timing.

Other regulatory guides

Detailed guides to regulatory process and requirements in the ISR, including the Beaufort offshore, are available from the Regulatory Roadmaps Project at www.oilandgasguides.com. These include:

- *A Guide to Regulatory Approval Processes for Oil and Natural Gas Exploration and Production in the Inuvialuit Settlement Region* (Sloan et. al. 2001)
- *A Guide to Regulatory Approval Processes for Oil and Natural Gas Exploration and Production in the Beaufort Sea* (Sloan et. al. 2002).

1.4.2 Future revisions

Generic application

This Guide has been developed with the pending applications for natural gas exploration and development in mind; however, the guidance provided is applicable to any type of project. EIA and CEA have to take into account the nature of the activity, and the specific regulatory context and constraints in which the activity would be conducted.

Evolving practice

The capacity for CEA and management in Canada in general is evolving, and this is equally true in the ISR. This includes the respective roles of industry and

[1] available as a PDF file download from www.bmmda.nt.ca/downloads.htm

government in addressing cumulative effects issues, whether for assessment or management of effects (e.g., possible joint participation in initiatives to address regional effects in the Mackenzie Delta). Future initiatives on cumulative effects management in the ISR may substantially change the context of CEA.

2 Wise stewardship and CEA

2.1 Wise stewardship

A balanced economy is preferred

The development of a balanced economy is vital to the quality of life that will be available in the ISR in the years to come. Most people who live in the ISR would prefer to be able to continue to make choices between the wage economy, the subsistence economy and a blend of both. The aspirations of the people in the region will be met if the development of natural resources is balanced through the effective management of cumulative effects as part of a coordinated policy framework (NRTEE 2001, WMAC (NWT) and FJMC 1988, IUCN 1993). While there is renewed interest in the jobs and revenue that will be associated with the development of the hydrocarbon reserves that occur in the ISR, there is also concern for potential cumulative effects from all types of human activity.

It is not possible to accurately forecast the pattern of potential development in the ISR because of uncertainty associated with defining the underlying geology and with the markets.

Implications of increased development

While some development has occurred in the ISR, there is potential for increased industrial (e.g., petroleum and minerals) and commercial (e.g., herding) activity over the next several decades. Some projects will proceed and these projects will produce effects on the environment. Over time, a pattern of development will emerge and the intensity of human activity in the region will increase. Local effects will start interacting in a cumulative way and impacts on the environment will extend across parts of the region.

Subsistence economy

This emerging pattern of development will occur in a region where the subsistence economy is *as important* as the wage economy. People in the ISR rely on country foods not just for social, cultural and nutritional reasons but also because they derive a fundamental part of their identity from the time that they spend on the land "re-creating" themselves. Hunters in spring camps welcome the change in diet from caribou, moose and fish to the fat rich diets of the returning geese. Social ties are renewed in camps and the culture of sharing is reinforced with gifts of meat when the hunters and their families return to their home communities. Similar positive social forces come into play during summer whaling and fall hunting for caribou and moose.

Concern about change

People in the ISR are concerned about the impacts of individual projects as well as the cumulative effects that could be associated with multiple projects. Industrial developments can affect traditional lifestyles if they change the distribution, abundance or productivity of the plant, fish and wildlife species that are important to the subsistence economy. Changes in water quality and air quality can also affect the desire of people to use certain areas or water sources, or to eat fish and wildlife from what they perceive are contaminated sites. Industrial development can also affect the quality of life of individuals while they are spending time on the land by altering the appearance and aesthetics of the surroundings.

Ideal situation

Ideally, future resource extraction activities will be separated in space and time from traditional camps and hunting, fishing, whaling sites, and trapping areas to the extent that evidence of industrial activity is not detectable. This ideal situation can be altered by degrees until it eventually intrudes upon the enjoyment of individuals traveling on the land. People's tolerance to the evidence of industrial development and its associated access varies among individuals and cultures in and outside the ISR.

2.2 The importance of community participation

Participation

The environmental screening and review process for the ISR requires that the proponent consult with the affected communities, and that communities have the opportunity to influence the determination of effects (e.g., identification of valued species, references to the community conservation plans [CCPs] relative to areas where development may be excluded or constrained). People in the ISR have a special relationship with the land and its wildlife and they are vitally concerned about the potential environmental effects and cumulative environmental effects of industrial developments on their subsistence economy. Beneficiaries of the claim want to be good ancestors and make sure that their children's children will be able to maintain the options of enjoying a life on the land, participating in the wage economy or living a lifestyle that incorporates a blend of the wage economy and the subsistence economy.

Lower costs

The EIA process offers a good opportunity for proponents to meet Northerners as they consult with the communities on their plans for development. Proponents will be able to move their projects ahead more quickly and at a lower cost if they establish long-term positive relationships based on trust.

Meaningful participants

Community consultation provides an opportunity for proponents to learn from people who have used the land for generations. The Inuvialuit and the non-beneficiaries who live in the ISR are generally friendly people who come from a culture that is based on sharing. Because of their wealth of knowledge on the land and its resources, the Inuvialuit and other Northerners can be meaningful participants in each of the five steps in the environmental assessment process (scoping, assessment, mitigation, significance and follow-up).

Local knowledge

Local knowledge can and should be used in project assessments as a knowledge source that operates in parallel with the knowledge that is derived from science. Local knowledge can be particularly valuable in providing information on long term trends in the health of various species, seasonal habitat use and movements. Such trend information can be of considerable value in completing a good CEA.

Dialogue

The process of early, informal and ongoing dialogue between project proponents and community representatives can result in improvements to the design of projects and environmental management systems (EMSs) that would not otherwise occur. Community members have extensive local knowledge that can prove invaluable to project proponents. For example, local knowledge on environmental conditions that may affect a project (e.g., ice jam locations, permafrost changes) might be used to modify the project design to minimize environmental effects on a project. Local knowledge can be used to minimize projects effects on the environment and human use (e.g., design of the height of

project components so their silhouette from a distant vantage point, as viewed by a hunter, will blend in with the surrounding landscape).

Consultation

For completeness, consultation should include discussions with representatives of the affected:

- Hunters' and Trappers' Committees (HTCs)
- Inuvialuit Game Council (IGC)
- Fisheries Joint Management Committee (FJMC)
- Inuvialuit Land Administration (ILA)
- Wildlife Management Advisory Council, Northwest Territories (WMAC [NWT])
- Wildlife Management Advisory Council, North Slope (WMAC [NS])

The discussions with Regulatory Authorities would include:

- Indian and Northern Affairs Canada (INAC)
- Canadian Environmental Assessment Agency
- Fisheries and Oceans Canada
- Environment Canada (e.g., Canadian Wildlife Service, Environmental Protection Branch)
- Canadian Coast Guard
- Government of the Northwest Territories Department of Resources, Wildlife and Economic Development (GNWT RWED)

If developments are proposed for private lands, then potential developers should also consult with the affected community corporations.

Scoping

The process of consultation should be started as early as possible. All of the early consultation by a proponent qualifies as scoping in the environmental assessment process. There is no wasted effort or funding involved in early consultations as scoping is a vital step. The categories of scoping are described in this report in detail, and they include:

- issue identification
- selection of VECs (valued ecosystem components)
- identification of spatial and temporal boundaries
- identification of other projects
- development of an interaction matrix
- definition of measurable parameters for VECs.

3 What must I understand to do CEA well?

3.1 What are cumulative effects?

Defining cumulative effects

A cumulative effect is a change to the environment that is caused by a human action in combination with other past, present and future human actions (Hegmann et al. 1999).

An action is a project or an activity. A project is anything that is constructed and operated. An activity is any human presence on the land, air or water.

Cumulative effects assessment

A CEA is an assessment of cumulative effects.

Types of effects

There are two general types of effects of interest to the EISC and EIRB:

1. Effects on the environment, where "environment" is ecological in nature (see Appendix B of EISC 2001 Operating Guidelines and Procedures)
2. Effects on wildlife harvesting.

3.2 Understanding cumulative effects assessment

Questions

How big an area do I need to assess?

How many environmental features do I need to assess?

How can I say how important the effects are?

What if other projects are contributing more than my project to effects?

These are typical questions asked by practitioners when faced with assessing cumulative effects as part of their project application.

An assessment done well

To begin to answer these questions, first consider the following:

A CEA is an EIA done well.

This means that when you submit an EIA, you do what you've always done, but you also look for any possibility that your project may have an effect that leads to cumulative effects. However, other than that, all the usual conventions you do for EIAs apply. Some details of the methodology for the CEA, such as the final resolution of the temporal and spatial boundaries for the regional study area, may need to be refined as the assessment proceeds.

The adequacy of an assessment will be determined on a case-by-case basis. To start, follow the guidance in this document. Keep in mind that:

The purpose of any assessment is to provide adequate information to the reviewer to assist them in making a determination on the fate of your application.

Establishing a proportional response

EIAs and CEAs for proposed projects in the ISR will need to be scaled so that the level of assessment reflects both the geographic extent and the intensity of the proposed project. For example, CEAs for small 2D seismic operations will usually be straightforward (remembering though that the entire submission must be thorough and completely outline the program) and may only require a few paragraphs of text and a map for the assessment before they are ready for submission to the Screening Committee (exceptions can occur if your "small" seismic program nonetheless causes an effect of considerable concern). CEAs for larger projects such as exploration wells with associated access roads and gravel pits will require CEAs that consider potential impacts on all of the VECs in a comprehensive way.

Reviewers expect the basics

The reviewers of your application will expect a clear communication of answers to their principal question: *Does the project cause a problem of concern with respect to something that we value?*

The reviewers basic expectations for answering this means that you must answer the following questions:

1. Will the project have a measurable effect on the VEC in question?
2. Will the project effect act in a cumulative fashion with those of other land use pressures?
3. Will the project effect, in combination with other land use effects, measurably change the state of the VEC?

If proponents use these questions to guide the completion of their CEA, then they can be confident that the CEA will address the necessary issues and that potential cumulative effects are adequately considered. If proponents make sure that their reports are reader-friendly with superior maps and graphics and they involve all of the key stakeholders in the process from the outset, there is an excellent chance that their work will be accepted as complete by the EISC and the EIRB (i.e., not guaranteeing approval, but by providing the best and most complete information possible to help them in their review).

Reviewers want to see evidence that you have covered these basics. How you've done them, whether through professional judgement or computer modelling, is less important than ensuring you have a clear, defensible assessment that recognizes uncertainties yet comes to a conclusion with respect to significance. This must be based as much as possible on views and knowledge of both residents of the ISR and your technical specialists. The more detailed knowledge you provide reviewers, the easier it will be for them to make their determination. The level and amount of information you provide should be in proportion to the potential effects of your project. "Small" projects do not represent an excuse for failing to investigate the possibility of cumulative effects.

Establishing significance

The final and perhaps most important question is how do you know something is a "concern" (and for that matter, how do the reviewers know?). First, in most cases, nobody has a clear answer to this. Unless your project obviously causes an exceedance of a known regulatory threshold, or is right on top of something and will destroy it (such as a staging area for white-fronted geese), the evaluation of significance is based on many different facts and views. Again, it

is your job to provide enough information to reviewers to allow them to make their conclusions. In most situations, you therefore should do the following:

1. Minimize your project's effects as much as possible through mitigation (e.g., by good engineering design, environmental best practices).
2. After you have done as much as you can, identify opportunities to manage cumulative effects through coordinated efforts involving yourself and other proponents and government.

It is in your best interests to offer the most complete EMS you are willing to commit to.

To place your project in context, consider the following as spoken by an Inuvialuit elder when asked to explain his views on stewardship:

Ensuring that if we take caribou, there will be caribou the next year and the year after that. The same for anything else. This applies to all uses of the land: if it is used and enjoyed now, it must be left and preserved so that it will be there for the next year and for future years.

(Peter Green, Paulatuk CCP)

3.3 Understand practical limitations of assessments

Despite the advancements that have been made in understanding how species and ecosystems respond to human impacts, and in methods to assess and quantify these impacts, the reality is that there are substantial technological limitations in effectively assessing cumulative effects. Specifically, there is a need to recognize our limitations and improve our capabilities in relation to:

- **scientific uncertainty** (our ability to understand how cumulative effects are manifested and how they affect an ecosystem's capacity to persist and remain healthy)
- **analytical uncertainty** (our ability to measure effects in the field or to utilize mathematical tools and data to predict and characterize cumulative effects).

These limitations do not mean that we should not attempt to measure cumulative effects, but rather that we must recognize the existing limitations in completing screenings and assessments of specific projects. Depending on the type of project, the other human activities in the region and the potential for cumulative effects, qualitative, semi-quantitative or quantitative approaches to CEA may be appropriate.

3.3.1 Scientific uncertainty

Ecosystem response

We do not have a good understanding of the likely responses of ecosystems to human activities and infrastructure. Some studies have been completed on responses of terrestrial and marine wildlife to noise (e.g., seismic programs, ship traffic, compressor stations, aircraft over-flights), biochemical responses of invertebrates and fish to drilling muds and hydrocarbons, and toxic effects of oil

spills and other contaminants to some fish, vegetation and wildlife species.

Information not available

Where information is not available for the ISR, it is reasonable to use information from similar and adjacent areas. For example, information from the Prudhoe Bay oil fields will be useful in helping to better understand effects of developments on marine and terrestrial ecosystems and key species in similar ecosystems (e.g., barren ground caribou, waterfowl, grizzly bear, marine mammals, fish).

Of greater concern, we presently are not able to assess how multiple pressures from human and natural sources may affect a species or ecosystem. The ability of an individual or population to survive or reproduce may be affected by a number of negative and positive pressures including human impacts, natural catastrophes (e.g., severe weather events), changing predator-prey relationships and forest fires. These effects may combine in a number of ways (e.g., additive, synergistic, complimentary or compensatory). While a project-specific CEA is not responsible for assessing all of these external effects, the assessment of impact needs to consider how a project-specific effect or suite of project-specific effects will interact with these external factors (i.e., the ability of a species to assimilate project-specific effects in light of other past, existing or future pressures on that species).

3.3.2 Analytical uncertainty

Even when we have an understanding of how the environment may be affected by multiple pressures from human and natural sources, we may be constrained in assessing cumulative effects as a result of:

- available data on other regional pressures
- available data on the species or ecosystem component
- tools to measure the potential cumulative effect.

Surrogate measurements

Good CEA requires information on where, when, how and how much human activity or development has, is or will occur. Project-specific CEA (i.e., an assessment of cumulative effects done as part of a project application under regulatory review) must often consider a much larger regional area than the assessment for only project-specific effects. In many cases in the ISR and other regions, such data on other human activities and infrastructure is usually not available. Because collection of this information is expensive and labour intensive, it is not reasonable to assume that quantitative data on human activities and infrastructure can be generated by the proponent for project-specific screenings or even some environmental reviews. As a result, it may be necessary for the proponent to use semi-quantitative data or surrogate measurements (e.g., seismic line densities) in characterizing human pressures.

Availability of data

A second limitation in completing a project-specific, CEA is the availability of data on the current status of a species or ecosystem component. To effectively assess the importance of project-specific cumulative effects on a species, we need to know the current status of that species, as well as how past, existing and reasonably foreseeable pressures will change the status of the species. For most species in the ISR, we do not have suitable data to characterize a species' status or its trends. Instead, qualitative scientific data and local knowledge may have

to be used; and, in some cases, traditional or "local" knowledge may be the only or best alternative.

A third constraint may be the lack of suitable analytical tools and methods to measure cumulative effects. Modeling tools are available for some species or ecosystem attributes for other geographic locales (e.g., air quality, barren ground caribou, grizzly bear, biodiversity). These tools will need to be adapted to suit the specific conditions within the ISR. For other species or species groups (e.g., waterfowl, whales or fish), new tools may have to be developed or assessments will have to rely on semi-quantitative or qualitative approaches. In some cases, we may have to rely on professional judgment and local knowledge.

4 What questions need to be answered?

4.1 Purposes of CEA from the proponent's perspective

Best practices

The CEA of a project in the ISR, or anywhere else for that matter, is a valuable step in a "best practices" approach to the environmental design and operation of a project. Through the assessment process, the proponent becomes more aware of the way in which the project will interact with and stress the environment, and enables the proponent to plan and implement mitigation approaches that may reduce full-cycle costs of management, closure and reclamation.

More immediately, CEA is required in order to satisfy the requirements of the EISC and the EIRB. The EISC reviews most developments in the ISR before government is permitted to issue an authorization to proceed. The EISC *Operating Guidelines and Procedures* (Section 4.4) require that the project description prepared by the proponent include the identification and assessment of "the cumulative effects of the proposed development and other activities in the area".

CEAA

For projects that will require authorizations that bring CEAA into effect, a CEA is also required. For any level of environmental assessment under CEAA, including a screening, the act requires that the federal responsible authority ensure that a CEA be conducted and taken into account in the relevant determination. The work done by the proponent on the project description and other application processes will be used as an input to the Regulatory Authorities' consideration of environmental impacts, including cumulative environmental impacts of the project.

4.2 Who is the assessor?

In order to make a screening or review determination, an assessment must be made of the potential for environmental impacts for projects meeting the screening or review criteria of the EISC or EIRB, respectively. For the EISC, the requirement is to make an "adequate preliminary assessment". In practice, this is based on the project description prepared by the proponent, together with comment solicited from other parties.

Proponent is the assessor

The primary assessor is therefore the proponent. The EISC (or EIRB) is a secondary assessor: it reviews the assessment provided, and determines whether it is satisfactory for its purposes. The EISC may return the project description to the proponent if the EISC considers it deficient (the EISC then asks the proponent to fill in all the necessary information gaps and resubmit before the next available Screening Meeting submission deadline). The EISC makes this judgement call in the context of the requirements set out in the EISC *Operating Guidelines and Procedures*. The EISC (or EIRB) may also take into account any other advice that it considers appropriate. Once additional information has been provided, the EISC makes a determination as to whether or not there are significant negative impacts on the environment or on present or future wildlife

harvesting. Supplemental information may be requested prior to decision, in addition to the original information submitted, for clarification or to provide information to the EIRB.

4.3 Draft guidance for the screener and reviewer

For the work undertaken by the proponent to be useful as a basis for screening by the EISC, it is important for the proponent and the EISC to have a shared understanding of the requirements for CEA, as well as for other aspects of the EIA.

In particular, the screener/reviewer and the proponent should be working with a common understanding of the following:

- **The definition of cumulative environmental effects:** As mentioned the definitions and the common usage of the term "cumulative environmental effect" can be sweeping and vague. At present there is no definition of cumulative environmental effects in Appendix B of the EISC *Operating Guidelines and Procedures*.
- **Requirements for assessment of cumulative effects**: In particular, what other activities need to be taken into account? What is the scope of the assessment in time and space?
- **Criteria on significance:** This is needed so the Proponent understands what will determine "significance" in the mind of the screener or reviewer.

A companion guide has been drafted for screeners and reviewers to provide guidance in their review of CEAs, which can also serve as guidance to proponents on matters of concern and focus to the screeners and reviewers.

4.3.1 Questions for the assessor

Is the project likely to have negative environmental effects on VECs in the ISR?

If so, will the residual negative environmental effects, which remain after mitigation, combine with the effects of other projects, past, present, or future?

What is the significance of the overall cumulative environmental effects, including the effect of the project?

If this project, in combination with other projects in the area, is likely to create a "significant negative cumulative effect", are there further mitigation measures that could reduce or eliminate the project's contribution to these effects so that the combined effect is not significant.

4.3.2 Questions for the screener and reviewer

While the job of actually doing the environmental assessment is the assessors (i.e., the proponent), the screeners and reviewers have to consider the assessment undertaken, decide upon the validity of the assessment, its reasoning and assumptions as a basis for a determination.

Does the project description provide a sound basis for an "adequate preliminary assessment"?

- Has the proponent developed a reasonable case regarding the environmental effects of the project and of the cumulative environmental effects of the project together with other projects?
- Are assumptions about the extent of other activities in the area reasonable?
- Has the proponent provided a view of how the effects of the project may interact with the effects from other projects or activities?
- Has a reasonable effort been made, in proportion to the potential impact (intrusiveness, range of effects, durability of effect) of the project?
- Does the assessment satisfy the requirements for cumulative environmental effects assessment as set out formally and informally by the screener or reviewer?

Has the proponent shown how the project's contribution to cumulative environmental effects will be avoided or mitigated?

Do other sources cast substantial doubt on the assessment provided in the project description?

It is the practice of the EISC to solicit comment and information from other sources, including affected HTCs, co-management bodies and departments and agencies of government. It is quite possible that comments from other sources may suggest that the project description is inadequate or wrong in a substantial way; i.e., in a way that the determination of the EISC would be affected. Procedural fairness requires that the EISC review the information provided by other sources with the same critical standards as it applies to the project description. It is appropriate for the EISC to consider the validity of the information, the assumptions used and the relevance to the determination of "significant negative environmental effects".

Nevertheless, it may be prudent for the proponent to request an opportunity to make a presentation to the EISC as a whole (See EISC *Operating Guidelines and Procedures*, Section 8.1). This approach may be prudent if the proposal is controversial, complex or coincides with several other projects that may be perceived as increasing the risk of cumulative environmental effects.

Is the project likely to cause negative environmental effects on important VECs in the ISR?

Is the project likely to contribute to negative cumulative environmental effects, when the effects of this project are combined with those of other projects?

If so, are these effects significant?

This is the most subjective, and also the most challenging question that the screener has to address. In the preparation of the project description, the proponent should have assessed significance, based on criteria that have been provided to it by the EISC. At present, the criteria used by the EISC in relation to significance is stated in Appendix D (EISC *Operating Guidelines and Procedures*), s. 10.

If it appears likely that there will be significant negative cumulative environmental effects, can further mitigation measures be implemented that would effectively eliminate or reduce the effects so that they are no longer significant?

- Does the assessment fully take into account mandatory restrictions on all similar activities that are imposed by laws of general application, regulations and guidelines (e.g., any directives or advisories from Fisheries and Oceans Canada, Canadian Wildlife Service, RWED or the ILA)?
- Legal requirements should have been taken into account during the preparation of the project description or EIS. It is important for the screener or reviewer to know that the proponent understands the regulatory framework in which the project will operate. If there are particular aspects of legislation and regulation that will affect the design and operation of the project, the proponent should ensure that these are described in the project description.
- Are there further measures that the proponent could voluntarily commit to that would reduce the effects beneath a threshold of significance?
- If so, the proponent should state whether such alternatives will be adopted, and if not, then for what reasons.
- Can the project's effects be mitigated through the attachment by regulators of enforceable terms and conditions to specific authorizations?
- The responsibility for attachment of such terms and conditions is that of the regulators issuing the authorization. The EISC is not able to recommend terms and conditions, but can flag them as assumptions made in coming to a determination.

5 What needs to be done in an assessment?

This section provides an overview of preferred approaches by proponents in completing a CEA for an environmental screening or an environmental review. Proponents are advised to consult the *Cumulative Effects Assessment Practitioners Guide* (Hegmann et al. 1999)[2] for details on specific approaches and methods for CEA.

Proponents must consult with community organizations, Inuvialuit organizations, co-management bodies and government agencies to ensure that CEAs address the key concerns associated with the project and adjacent land uses, and that the analysis is appropriate for the type and level of development and anticipated effects. "Small" projects may not necessarily result in small incremental changes to cumulative effects.

The five steps

The following sections are organized by the five principal steps in any assessment:

1. scoping
2. analysis
3. mitigation
4. significance
5. follow-up.

5.1 How does the work get started? (scoping)

To repeat, the fundamental guiding questions to be answered in an assessment are:

1. Is the project likely to have negative environmental effects on VECs in the ISR?
2. If so, will the residual negative environmental effects that remain after mitigation, combine with the effects of other projects, past, present, or future?
3. What is the significance of the overall cumulative environmental effects, including the effect of the project?
4. If this project, in combination with other projects in the area, is likely to create a "significant negative cumulative effect", are there further mitigation measures that could reduce or eliminate the project's contribution to these effects so that the combined effect is not significant?

[2] Available from the Canadian Environmental Assessment Agency Internet site at www.ceaa-acee.gc.ca

Answering these questions begins with scoping. Scoping a CEA is a fundamental first step in ensuring that:

- the assessment addresses all potentially important issues
- appropriate indicators and measurable parameters are selected for assessing impacts associated with these issues
- spatial and temporal bounds are appropriate for the type of proposed activities and their potential contribution to cumulative effects
- all other relevant industrial activities and human uses are considered in quantifying cumulative effects.

If scoping is not well done, the CEA will not be focused and will not adequately address the issues. Important issues may also be missed. Proponents are therefore encouraged to carefully complete the scoping task for environmental screenings or environmental reviews. Scoping should include consultation with the HTCs, IGC, WMAC (NWT), WMAC (NS) (as appropriate), FJMC as well as with the appropriate federal and territorial agencies.

5.1.1 Identifying issues

For each proposed development requiring an environmental screening or an environmental review, proponents must consult with the organizations identified in Section 2.2.

It is also important to note that the Inuvialuit and Joint Secretariat place a high importance on the knowledge of Inuvialuit Elders (referred to as "Traditional Knowledge" or TK). This knowledge is gathered by meeting with elders in the ISR and by researching literature that has previously recorded this knowledge. In addition, the CCPs of Inuvik, Tuktoyaktuk, Aklavik, Paulatuk, Olokhaktomiut (Holman), and Sachs Harbour are important documents that show the values of the community and incorporate traditional knowledge.

Both the Inuvialuit people and documents such as the CCPs are important resources for proponents during all phases of planning, implementation and decommissioning of a development. While there is no legal requirement to use the CCPs, the proponent is advised to refer to them often to help guide their decisions and actions and to help create an atmosphere of mutual respect between the proponents and the communities in which they will be working.

It is also useful to review other available literature, such as earlier scientific studies, assessments and reviews and Board decisions to become better familiar with what has been raised before as issues. Government (Inuvialuit, territorial and federal) and university Internet sites (for example, those listed in Section 6.2) increasingly offer access to publications, such as oil and gas development proposals in the 1980s (e.g., Beaufort Sea Environmental Assessment Panel 1984[3]).

[3] For this and other earlier publications, it is important to recognize that knowledge and data gaps may have then existed that have since been addressed. Such material therefore may sometimes be more useful in providing a historical background than as an authoritative reference.

Potential issues due to human disturbance and activities *within* the ISR are summarized in Table 5-1. These effects, any of which could lead to a cumulative effect (see box below), are based on past, present and reasonably-foreseeable future industrial and human uses within the ISR. Specific issues that should be considered for a proposed activity or development will depend on the location of the activity or development, as well as temporal and operational considerations.

When does an effect become a cumulative effect? Say that your project has some type of effect, such as noise heard by caribou. Also say that another project not related to yours has the same effect. Now, there is a cumulative effect on caribou because there is another project affecting that same caribou.

There are also some existing issues due to human disturbance and activities *outside* the ISR that cause effects within the ISR; principally, climate change and long-range transport of air pollutants (LRTAP). The spatial extent of these effects is international in scope, with effects broadly distributed throughout the circumpolar north. As such, in the context of project-specific applications within the ISR, these effects can be recognized, where appropriate given the nature of the project and environmental setting, as environmental effects on the project (e.g., climate change) or as part of the background environmental setting (e.g., permafrost changes and persistent organic pollutants [POPs], an example of an LRTAP).

Table 5-1 Potential issues in the ISR

Discipline	Issues
Air	• addition of emissions resulting in alteration of air quality • addition of emissions resulting in changes in visibility (e.g., ice fog) • release of acidic gases and effects on sensitive soils and vegetation • noxious odours resulting in health concerns or complaints from local residents
Noise	• alteration of background noise levels (see also effects on wildlife and traditional use)
Groundwater	• interference with groundwater flow resulting in changes in groundwater and/or surface water flow regimes • release of effluents or solid waste resulting in changes in groundwater quality
Surface Water	• interference with surface water flow patterns resulting in altered surface water flow patterns, changes in channel morphology, or channel locations • removal of water resulting in lower flows or water levels, particularly during winter • release of effluents or solid waste resulting in changes in surface water quality • disturbance of soils or permafrost resulting in release of sediment to surface water bodies and channels

Table 5-1 Potential issues in the ISR (cont'd)

Discipline	Issues
Fish and Aquatic Habitat	• direct removal of fish habitat • disturbance of fish habitat through chemical or physical (e.g., sedimentation) changes in water quality • disturbance or loss of fish habitat due to changes in surface and/or groundwater flows and water levels, particularly during winter • mortality of fish due to changes in water quality or altered water flows • mortality of fish through physical injury caused by operations • mortality of fish due to harvesting
Soils and Terrain	• disturbance of permafrost resulting in changes in slope or bank stability • preferential removal of gravel resulting in loss of landscape elements such as eskers • improved access and increased soil erosion due to all terrain vehicles and other uses
Vegetation	• disturbance or removal of vegetation resulting in loss or fragmentation of vegetation communities • disturbance or removal of vegetation resulting in loss of special status vegetation species • effects of acid emissions on vegetation and changes in species composition • disturbance or removal of vegetation which results in changes to species composition • introduction of exotic species resulting in changes in species composition
Terrestrial wildlife	• direct loss of habitat through removal or disturbance by development of project footprints • sensory disturbance from human activity resulting in alienation of habitat (short-term to long-term) • fragmentation of habitat through direct habitat loss and habitat alienation • blockage of movements as a result of direct habitat loss and habitat alienation and/or physical barriers • creation of new access resulting in increased hunting pressure and animal mortality • creation of new access resulting in improved travel routes for predators and increased animal mortality • attraction of wildlife to work sites or other activity areas and potential for wildlife-human interactions, resulting in control actions • ingestion of effluents or solid waste or contaminated prey resulting in acute or chronic toxic effects

Table 5-1 Potential issues in the ISR (cont'd)

Discipline	Issues
Marine mammals	• direct loss of habitat through project footprints (e.g., offshore islands) • alteration of sea ice (e.g., ice breaking) resulting in altered movement patterns or distributions • underwater noise resulting in avoidance of area (and loss of habitat) and/or changes in seasonal movement patterns • sensory disturbance of animals during pupping or maternal denning • attraction of polar bear to work sites and potential for wildlife-human interactions, resulting in control actions • ingestion of effluents or solid waste or contaminated prey resulting in acute or chronic toxic effects
Traditional Use	• direct loss of harvesting areas due to project footprints • direct loss of harvesting areas due to nearby noise and human activity, and avoidance of area by harvested species • indirect loss of harvesting areas due to nearby noise and human activity, and avoidance by hunters • real or perceived concerns for contamination of fish or wildlife and resulting changes in harvesting • increased harvesting pressures and/or altered distribution of use due to improved access
Socio-economic[1]	• creation of short-term and long-term employment • creation of business opportunities • increase in disposable income • requirement for new or upgraded infrastructure • increased need for government services • changes in community well being and social structure
Other Land Use	• direct loss of use area due to project footprints • interference with operations (e.g., quality of experience for wilderness tours/lodges) due to noise disturbances and human activity • potential for induced development due to improved access or improved infrastructure

Note: 1 Not an information requirement for Screenings, but required for Reviews.

5.1.2 Identifying valued ecosystem components and indicators

When the major cumulative effects issues have been identified, the proponent should select one or more valued ecosystem components (VECs) to qualify or quantify each of them. VECs are resources or environmental features that:

- are important to local human populations
- have national or international profiles
- will be of future importance in evaluating the impacts of development or human actions and in focusing management or regulatory policy if they are altered from their existing status (see Beanlands and Duinker 1983).

VECs are best selected through consultation with the organizations mentioned in Section 2.2. Proponents should also carefully review the CCPs while they select VECs.

For each VEC, the assessment team should select one or more measurable parameters that will be used to qualify or quantify the specific cumulative effect. Examples of VECs and measurable parameters for some of the issues described above are provided in Table 5-2.

Table 5-2 Examples of valued ecosystem components and measurable indicators

Issue	VECs	Measurable Parameters
Degradation of air quality	Quality of air	Concentrations of SO_x and NO_x (e.g., ppm)
Sedimentation effects	Quality of fish habitat	Suspended solids (TSS, TDS)
Loss of vegetation communities	Diversity of vegetation communities	Distribution and abundance of specific community types
Fragmentation of wildlife habitat	Grizzly bear habitat	Changes in number and extent of core security areas

5.1.3 Establishing spatial boundaries

Establishing the spatial boundary for a CEA requires consideration of the spatial extent of the effect from the project under evaluation, as well as the spatial extent of similar effects from other projects and human activities in the region. Spatial bounding must also take into account whether the effect is stationary (i.e., a project footprint) or mobile (e.g., an emission plume or an effluent discharge), and whether the VEC that may be affected by the project effect is mobile (e.g., caribou, migratory fish) or relatively stationary (i.e., vegetation, highly territorial wildlife or fish, traditional harvesting sites).

The spatial boundary is important for two reasons:

- it provides the context within which included projects will be identified (see below)
- it provides a basis for evaluating and quantifying impact significance.

In general, the spatial boundary for a CEA should encompass all of the area affected by a specific project effect, as well as the area affected by similar effects from other projects or human activities that overlap with the project effect. This area generally extends to the furthest distance at which the contribution of the project's residual (i.e., post-mitigation) effect is no longer measurable or could reasonably be expected to occur. General guidelines for determining the spatial boundary for a CEA are summarized in Table 5-3.

Table 5-3 Guidelines for establishing spatial boundaries

Effect	VEC	Approach
Stationary	Stationary	• for vegetation or relatively stationary fish and wildlife species, the affected drainage basin(s) or population subunit • for traditionally harvested species, the area encompassing other similar harvesting areas
	Mobile	• for groundwater, defined aquifer and surface water interactions • for surface water, affected reaches or drainage basins • for fish, the affected reaches or drainage basin(s) • for wildlife, the affected habitats or drainage basin • for traditional harvesting, the drainage basin or geographic area in which the harvesting occurs
Mobile	Stationary	• for vegetation or relatively stationary fish and wildlife species, all of the affected drainage basin(s) or the population subunit(s) • for traditionally harvested areas, the area encompassing other similar harvesting areas similarly affected
	Mobile	• for surface and groundwater withdrawals, the drainage basin in which the withdrawals occur • for effluent discharges into surface water, the drainage basin in which the discharge occurs, downstream to where the effluent is no longer detectable • for aerial emission effects on mobile wildlife, the range of the population • for sensory disturbance effects on wildlife, the range of the wildlife population or population subunit • for disturbance effects on traditional harvesting, the area currently used for harvesting

These guidelines should be used to assist you in selecting an appropriate spatial scale for your assessment. In developing spatial boundaries for your assessment, proponents should consider that:

- study area boundaries will vary with the VEC in question, as well as with different issues (e.g., the study area boundary for water effluents will be different from that used for barren ground caribou or beluga whales)
- study area boundaries should represent meaningful ecological units for the VEC in question
- study area boundaries should reflect the anticipated severity of project contributions to cumulative effects
- study areas should allow for the collection and analysis of VEC data at a reasonable cost to the project in question
- study area boundary selection should reflect the input and advice of regional resource managers.

5.1.4 Establishing temporal boundaries

To determine how the effects of a project or activity may interact with similar effects from past, present and reasonably-foreseeable projects and activities, it is necessary to establish a temporal bound for each cumulative effects issue. Where possible, the CEA should include all past projects or activities from which an effect can still be measured if that effect overlaps with a similar effect from the proposed project. Similarly, the CEA should include all reasonably-foreseeable projects that will produce similar effects as the proposed project and whose effects are likely to overlap in time with those from the proposed project. It is important that the temporal boundaries reflect the effect on the land base, VECs, harvesting activity or land use, and the duration of time required for these uses or the VECs to recover from that effect. Duration does not refer to the duration of the project activity.

Scenarios

While this approach is often possible for short-term projects (i.e., project duration of up to five years), it can become increasingly complex for long-term projects or projects with multiple phases. In these instances, it is often helpful to assess cumulative effects at several specific time periods (or "scenarios") relative to the project life span, specifically:

- *Pre-disturbance*: This refers to the condition of the land or resource base prior to visible disturbance and development. This can often be simulated (rather than tracked through historical records and data) by using geographic information systems (GIS) to 'remove' all human disturbances and developments and then quantifying the amount of available habitat, vegetation communities, harvesting areas, and so on.
- *Baseline*: The present condition of the land base, VEC or traditional use with existing levels of disturbance without the proposed project.
- *Operations*: One or more time periods during the project life may be used to predict the condition of the land, VEC or harvesting activity, taking into account the effect(s) of the project during those periods in combination with all other existing project and activity effects. At minimum, the operational

assessment should include the period of peak development or activity for the proposed project.

- *Closure*: This refers to the status of the land base, VEC or harvesting activity at the time that reclamation and monitoring work has ceased for the project.

5.1.5 Other projects and activities

Project inclusion list

During scoping, the assessment team typically develops a list of all other past, present and reasonably-foreseeable projects and activities that will be considered in the assessment of each cumulative effects issue. This list, referred to as the *project inclusion list*, is typically developed in parallel with the determination of the spatial and temporal boundaries.

Past projects and activities that should be addressed in the CEA include any events with a measurable effect that will overlap in time and space with a similar effect from the proposed project or activity.

For future projects, the CEA should include all reasonably-foreseeable projects or activities. These are typically defined as projects that are in some form of a recognized approval process for community, ISR, territorial and federal jurisdictions. Projects that have been identified in a draft or approved development plan may also be included. In general, project-specific CEAs do not typically have to address induced projects (i.e., projects that may be developed once the proposed project is underway). Because these projects are often hypothetical or conceptual in nature, few details on the operational specifications, timing or location of the project are available, thereby reducing the ability of the assessment to quantify cumulative effects.

Getting information about other projects

Information on past, present and reasonably-foreseeable projects can be obtained from several sources:

- CCPs[4]
- community representatives
- Indian and Northern Affairs Canada
- GNWT Resources, Wildlife and Economic Development
- ILA
- Joint Secretariat, Inuvialuit Renewable Resource Committees, EISC and EIRB
- National Energy Board (NEB).

5.1.6 Participation

As noted earlier, the participation of key stakeholders is an important component in completing the scoping task for CEA. Each of the above components can be clarified with key stakeholders during the participation

[4] available as a PDF file download from www.bmmda.nt.ca/downloads.htm

process already required under the environmental impact screening process. Key stakeholders in the ISR include:

- HTCs
- residents in each community (e.g., elders committees)
- users of traditional harvesting camps
- co-management boards including FJMC and the Wildlife Management Advisory Committee (NWT or North Slope, as appropriate) as well as the IGC
- territorial agencies, including RWED and the Department of Transportation
- federal agencies, including: Indian and Northern Affairs Canada, Canadian Environmental Assessment Agency, Fisheries and Oceans Canada, Environment Canada (e.g., Canadian Wildlife Service, Environmental Protection Branch) and Canadian Coast Guard.

Where effects from a project or activity may extend beyond the boundaries of the ISR (e.g., Gwich'in Settlement Region, Yukon, Nunavut, Alaska), it will be necessary to contact the land administration agencies in these jurisdictions for information on past, present and reasonably-foreseeable projects and activities.

5.2 How are effects assessed? (analysis)

5.2.1 Defining project effects and contributions to overall effects

While all human activities, developments and projects can contribute to cumulative effects in the land base, VECs, traditional use and other land uses, the purpose of a project-specific CEA is to determine how a proposed project or activity may add to effects of other past, present or reasonably-foreseeable projects and activities.

What a CEA should do

The *Cumulative Effects Assessment Practitioners Guide* (Hegmann et al. 1999) suggests that a project-specific CEA should fundamentally do the following:

1. determine if the project will have an effect on the VEC in question
2. if such an effect can be demonstrated, determine if the incremental effect acts cumulatively with the effects of other actions, either past, existing or future
3. determine if the effect of the project, in combination with other effects, may cause a significant change now or in the future in the characteristics of the VEC after the application of mitigation for that project.

What is assessed

Under CEAA, a proponent is not required to consider cumulative effects to which their project will not contribute. Project-specific CEAs need only consider those effects from a project that have the potential to interact with effects of other past, present or reasonably-foreseeable projects. Of note, project effects do not need to be significant to trigger the need for assessment of cumulative effects. Project-specific CEAs do not need to consider existing or potential regional effects for which a project will not make a contribution.

For example, if a proposed development will not generate any acidic emissions, then the project-specific CEA need not address cumulative effects of acidifying emissions. The only exception would be if acidifying emissions had the potential to interact with other effects from the project. Similarly, if a pipeline is proposed through grizzly bear range, but it will be contiguous with an existing right-of-way (RoW) for its entire length (i.e., no new access will need to be developed), the RoW for the proposed pipeline will not likely contribute to fragmentation of grizzly bear habitat or creation of new access. While direct losses of habitat may be assessed as part of the EIA, the CEA would not need to quantify habitat fragmentation and potential regional losses of core grizzly bear habitat. In contrast, if a new pipeline RoW was required in an area already disturbed by other RoWs and development, then such analyses would be appropriate.

5.2.2 Methodological approaches

Analytical tools

As noted earlier, a project must result in a detectable effect that has the potential to interact with effects from other projects and activities before cumulative effects must be considered in the project-specific assessment. Because of this, analytical tools for CEAs are commonly the same tools that would be used in the assessment of project-specific effects. The difference is that the analytical tools are often applied over a broader geographic region. Because of the data needs for some of these regional assessments, cumulative effects analyses often use data at a coarser scale than assessments of project-specific assessments. For example, project-specific effects to vegetation communities are often assessed using data at a scale of 1:50,000 to 1:125,000. In contrast, CEAs for the same communities are often based on data at a scale of 1:250,000.

A wide range of methodologies and tools exist for assessing cumulative effects on physical and environmental parameters. The reader is referred to the *Cumulative Effects Assessment Practitioners Guide* (Hegmann et al. 1999) for a discussion of the different types of tools and approaches that can be used in completing a CEA. The selection of these approaches and tools will depend on a number of factors:

- the expected severity of the project's contribution to regional cumulative effects
- the confidence of the assessors in the analytical approach and the available data
- the importance of the land base, VEC, harvesting activity or land use to local communities and regulatory agencies
- the potential to mitigate or manage project-specific effects and regional effects
- availability of data for the regional area and/or the potential to collect adequate data within the temporal and financial constraints of the project.

Further guidance on methods is available from the *Guidelines for Impact Assessment Methods to be used before the Environmental Impact Review Board* (EIRB 1994). [5]

5.3 How are effects managed? (mitigation)

5.3.1 Project effects management

Minimizing effects

An EMS for managing cumulative effects should be implemented as soon as design work begins[6]. An EMS not only helps secure earlier approvals and minimizes negative environmental and cumulative environmental effects, it can also be instrumental in establishing lasting relationships with community representatives. Meaningful dialogue about managing potential cumulative effects can also result in new ideas that will benefit everyone concerned. The *Guidelines for Environmental Protection of Oil and Gas Production in Arctic and Subarctic Regions* (IUCN 1993) outlines ways to reduce impacts while containing costs.

The best way to minimize cumulative effects is to minimize the direct effects of your project through good design and mitigation. And, when in doubt about the nature of an effect, manage, manage and manage that effect!

In recent years, proponents have begun paying more attention to designing smaller and ecologically "softer" footprints (see *The Natural History of An Arctic Oil Field* by Truett and Johnson 2000). More specifically, they are focusing on the size, duration, intensity, sequence, reclamation potential, associated access and access control options that could be associated with their projects.

Types of projects

Activities and infrastructure associated with oil and gas developments in the ISR, outside of the immediate communities themselves, include:

- ongoing seismic delineation (2D and 3D)
- trails, secondary roads and primary roads
- exploration and delineation wells
- service areas
- central gas processing facilities, possibly near Inuvik
- production pads
- gathering lines
- transmission lines
- compressor stations
- camps.

[5] available as a PDF file download from www.bmmda.nt.ca/downloads.htm

[6] An EMS is simply a "package" of measures a proponent will implement to manage the effects of its proposed project. Such measures typically include conventional mitigation, additional mitigation to further address special or unique circumstances and monitoring. Section 5.3 provides some examples of such initiatives.

A more comprehensive list of all of the types of facilities can be found in Chapter 3 of the *Guidelines for Environmental Protection* (IUCN 1993).

Oil and gas developments can result in adverse impacts on the environment in any discipline (e.g., air, water, soils, vegetation). People in the ISR are particularly concerned about the potential cumulative effects on wildlife.

Sensitivity of disturbance

Wildlife detect the presence of infrastructure through their senses and some species will experience increased stress or avoid areas surrounding developments. These areas are referred to as zones of influence (ZOIs) within which habitat effectiveness is reduced. For example, a species may avoid or spend a reduced amount of time within 200 m (the ZOI) of an access road, within which habitat effectiveness (i.e., the ratio of actual habitat suitability with disturbance to potential maximum suitability with no disturbance) is 0.5 or 50 percent.

There are a variety of measures that can be used to reduce the size of the zone of influence and to reduce the magnitude of the disturbance. This type of reduction can be one of the most readily effective means of reducing a project's effects on wildlife. Wildlife species become aware of human activity through some combination of signals that they receive as sights, sounds, smells and vibrations. Proposed project descriptions can be reviewed with respect to the signals that they will project into the environment.

Mitigation measures

Proponents and regulatory authorities need to increase their awareness of best practices and best available technologies for mitigating potential impacts of developments. Some measures for reducing the size of the footprints and potential disturbance to fish, terrestrial wildlife, marine mammals and migratory birds include:

- directional drilling to reduce the number of pads
- siting of all infrastructure to optimize the location, size, duration, sequence, reclamation potential and associated access roads
- timing of construction to avoid sensitive times of the year for wildlife
- building ice roads that melt and leave no trace
- constructing drill pads out of ice
- managing access to confine hunting, trapping and fishing near new trails and roads to areas where the communities want harvesting to occur
- adopting speed limits on all roads
- developing a policy on restrictions on hunting, trapping and fishing for employees
- coordinating air traffic with other operators to establish flight routes and minimum flight altitudes that will avoid sensitive areas and times for wildlife (see the Tourism Guidelines section in each CCP for recommended altitudes)
- implementing water control systems to ensure continuation of natural patterns of surface water flow
- controlling dust
- evaluating all means of minimizing the adverse impacts of flaring (e.g.,

turbines)

- elevating or burying pipeline gathering systems to facilitate the movements of caribou, reindeer and other wildlife
- developing innovative engineering design measures to limit the risk of subsidence
- implementing comprehensive light control systems (e.g., state-of-the-art industrial task lighting)
- implementing noise abatement measures
- adopting state-of-the-art waste management systems including daily incineration of garbage in bear proof containers where appropriate, and effective treatment of sewage and grey water
- strategically placing fencing where necessary to keep wildlife away from some infrastructure
- evaluating all height control measures for all infrastructure to potentially reduce visual line of sight distances.

The assessment of potential developments can be enhanced with modeling techniques that include viewshed analysis in computer based "virtual" environments. These techniques can provide powerful communication tools along with other map-based products for designing mitigation measures with community representatives.

There are other mitigation measures that can be considered by proponents, some of which may have unique applications to particular sets of circumstances. This Guide was not intended to prescribe a comprehensive list of measures (e.g., HSESG 2002). Effective measures should be developed through detailed discussions between proponents, their advisors and representatives from the communities.

5.3.2 Regional initiatives

Cumulative effects are often assessed and managed on a project-by-project basis particularly in regions like the ISR where the intensity of development, relative to the size of the landscape, remains at a relatively low level. Cumulative effects however can also be assessed and managed on a regional basis through a jointly coordinated and funded approach involving governments, proponents and public. Examples of such initiatives include regional monitoring to collect data and identify trends, consolidation of infrastructure through Integrated Landscape Management and regional access management.

Projects in a regional context

By definition, proponents are in a position to consider their particular project in its regional context and determine the extent to which they want to participate in regional initiatives. If a proponent's proposed project is not likely to produce much in the way of effects that may act in a cumulative fashion with the effects of other projects then that proponent may only need to keep themselves informed of the regional initiatives in an area. If, on the other hand, a proponent expects that there is a reasonable chance that their project could contribute to cumulative effects then they will need to be aware of all of the regional initiatives that may apply to the assessment and management of cumulative

effects from their project. At a minimum, the proponents for this type of project will need to be able to describe how their design plans and their EMS fits with regional initiatives.

If, as only one example, a project is located on or near good quality grizzly bear habitat, then the proponent will need to familiarize themselves with the regional initiatives that are underway to minimize the mortality of grizzly bears that include the use of bear-proof incinerators and electric fences. The proponent will need to review the co-management plan for grizzly bears and discuss its implementation with the appropriate staff from the GNWT RWED.

Leadership

Proponents may want to become leaders in the management of cumulative effects in the ISR by contributing to regional initiatives in ways that are "above and beyond the call". The assessment and management of cumulative effects is a critical issue in the ISR and a genuine effort by proponents to be part of the solution will serve them well. Proponents will be well received if they do all that is strictly required of them, explain how their project relates to regional initiatives and also make additional contributions to regional efforts.

The assessment and management of cumulative effects in the ISR is at an early stage. The development of regional initiatives is preliminary, so now is an ideal time for industry to become involved in the design and implementation of regional initiatives, possibly through participation in the Mackenzie Delta Operators' Group (MDOG).

Useful documents

There is no single, overarching framework to guide the assessment and management of cumulative effects in the ISR (see AXYS 2001 for an overview of potential approaches for the Canadian north). There are, however, a number of relevant documents that provide guidance that can be used by proponents to carefully place their particular project in a relevant and appropriate regional context. The first point of reference is, of course, the settlement claim itself.

The following is a list of the documents that are relevant to the consideration of a regional cumulative effects management framework:

- *The Inuvialuit Final Agreement*
- *A Community Based Regional Land Use Plan for the Mackenzie Delta – Beaufort Sea Region*
- *The Inuvialuit Renewable Resource Conservation and Management Plan*
- CCPs for Aklavik, Inuvik, Tuktoyaktuk, Paulatuk, Sachs Harbour and Holman
- *Principles for the conservation of migratory birds in the ISR*
- *The North American Waterfowl Management Plan*
- *The Arctic Goose Joint Venture*
- *The Beaufort Sea Beluga Management Plan*
- *The co-management plan for grizzly bears in the ISR*
- *The co-management plan for the Cape Bathurst, Bluenose West and Bluenose East caribou herds*
- *Sensitive Habitats of the Porcupine Caribou Herd* (Aklavik and Inuvik only)

- *Environmental Atlas for Beaufort Sea Oil Spill Response*
- *The Protected Areas Strategy for the NWT*
- *The Peary Caribou Recovery Plan* (Sachs and Holman only).

There is no single document that conveys an integrated sense of the aspirations of the beneficiaries of the claim with respect to *both* non-renewable and renewable resource developments in the ISR. The CCPs provide guidance with respect to those areas in the ISR where the six communities have agreed there needs to be special consideration with respect to the timing, location and extent of development.

In the absence of a single land use plan that can be translated onto a map at a scale that is relevant to individual leases, proponents are obliged to review the relevant regional documents and refer to them in their assessments where they are relevant.

In the case of large projects, assessment specialists who are working on behalf of the proponent would be well advised to collect copies of all of the relevant regional documents and anchor them in their library so that they are free from any possible criticism that they have not exercised due diligence.

Assessment specialists may also want to increase their awareness of the regional context that they are working in by referring to:

- The Internet site of the Inuvialuit Regional Corporation and its associated links www.inuvialuit.com
- The shared Internet site of the Joint Secretariat – Inuvialuit Renewable Resource Committees, RWED's Minerals, Oil and Gas Division and the Inuvialuit Land Corporation www.bmmda.nt.ca (go to downloads and ISR)
- Truett and Johnson's (eds) 2000 book called *The Natural History of an Arctic Oil Field*
- Clark, Hetherington, O'Neil and Zavitz's 1997 book called *Breaking Ice with Finesse*
- Vanderzwaag and Lamson's (eds) 1990 book called *The Challenge of Arctic Shipping*
- Recent issues and data gaps identification (AXYS 2001, KAVIK-AXYS 2001, 2002)

5.4 How is importance determined? (significance)

Residual effects

When cumulative effects have been assessed and appropriate mitigation and management measures have been proposed, the proponent must determine the residual effect; i.e., the effect remaining after mitigation and management has been applied. Although the EISC and the EIRB assess the significance of residual cumulative effects and determine a project's appropriateness or acceptability, it is the proponent's responsibility to discuss the significance of potential cumulative effects that the project may cause (see Appendix A3 for the criteria the EISC and EIRB currently use for evaluating significance).

To assess the significance of cumulative effects, the proponent should typically discuss and document:[7]

- the incremental contribution of their project to specific cumulative effects
- the importance of the predicted cumulative effect on the ability of the land base to (1) sustain the VECs, and (2) support traditional and other land uses including present or future wildlife harvesting.

The incremental contribution of a proposed project or activity to regional cumulative effects is usually determined through qualitative or quantitative analyses. The potential cumulative effect is compared both with and without the proposed project or activity.

The importance of the predicted cumulative effect on the ability of the landscape to support certain land uses or VECs is generally determined by comparing the predicted change in the land use or VEC to a standard or threshold value.

5.4.1 Thresholds

Available standards

Standards may be set by government agencies to protect human and environmental health (e.g., air quality and water quality standards) or to ensure fair allocation of a VEC (e.g., limits on groundwater withdrawal or use of surface water). Examples include the Canadian Council of Ministers of the Environment (CCME) standards for potable water, air quality standards for the Northwest Territories, and guidelines for water withdrawal (i.e., through the water licensing process).

What to do if thresholds are not available

For many environmental components such as fish and wildlife populations, vegetation diversity and traditional use, regulatory standards do not exist, nor is development of standards feasible given the complexity of determining acceptable standards and measuring the VEC state. Instead, thresholds are being developed to help assessors determine impact significance.

A threshold can be defined as a point or a range of values at which a VEC undergoes an unacceptable change or is impacted at an unacceptable level, either from an ecological or social perspective. Thresholds may be expressed as:

- a subjective desired state (e.g., a stated objective in a CCP or land use plan)
- a trend (e.g., maintenance of a certain growth rate in a fish or wildlife population or change in sustainable harvest)
- a specific numerical value or range of values (e.g., maximum access density per square kilometre).

Until thresholds are available, the following can be used to help establish possible thresholds for use in CEA:

- during consultations with HTCs and community residents, discuss how CCPs and the community's needs and desires can contribute to an

[7] Note: most of the guidelines presented in Section 5.4 are original material developed by KAVIK-AXYS Inc. based on the 25 years of experience of AXYS Environmental Consulting with environmental impact assessments in western and northern Canada.

evaluation of significance

- in the absence of established thresholds or standards, use standards and thresholds from other jurisdictions, with the proviso that geographic, ecological and social differences are taken into account
- use best professional judgement, including peer review and consensus
- keep up-to-date and informed of ongoing work by industry, government and non-government organizations regarding resource management and cumulative effects.

5.4.2 An approach to evaluating significance

5.4.2.1 The challenge

The best approach

Unless there is a clearly unacceptable effect, usually through the exceedance of a known threshold or the direct disturbance of an ecological feature, significance can ultimately only be determined through the subjective evaluation of many factors, none of which alone necessarily may suggest a significant effect. Therefore, the best approach for proponents is to provide detailed information to reviewers that outlines the implications of potential effects on VECs. Reviewers then take this information and apply their own judgement, incorporating the information provided.

Information requirements

What type of information is needed, and how much, particularly in the absence of thresholds? In answering this challenge, provide everything already discussed in proportion, at your discretion, to the relative contribution of the project to effects. You have to provide this anyway. This information is summarized in the checklist provided in Appendix A1. “In proportion” is best defined as a level of detail that best describes the likely effects.

Practitioners are often faced with requests to answer questions that they or nobody can readily answer. Typical of this are questions regarding the significance of effects on biological organisms. In the ISR, of most concern in this regards are effects on renewable resources; namely, harvested wildlife (including terrestrial, marine and avian species). Significance criteria can ask for an assessment of your project’s effects on the permanence and reversibility of the effect, and effects on distribution, abundance and productivity. Even with good long-term population data, knowledge about species responses to human disturbances, and sophisticated computer models, the ultimate conclusion on significance is in the end usually based on best judgement by biologists and elders.

The reviewers may legitimately ask difficult questions (such as in Appendix A3), but base their decision on your conclusions combined with their views that incorporate a recognition of the degree of their concern and their knowledge.

As a final note of guidance in recognition of the above, the depth of your management response to potential effects will be as important, or more important, than your actual assessment. In short, manage better rather than assess more when the basis of an assessment is uncertain.

5.4.2.2 The solution

There are a variety of options to evaluate significance. Typically, a few attributes of an effect are ranked and the combined meaning of these attributes are reviewed to assist, along with professional judgement and local knowledge, the preparation of a final conclusion of significance. The following is provided as one example of such an approach. It can be adopted as is or modified as specific circumstances require to meet the needs of a given project and environmental setting as long as the approach meets the spirit and intent of the EISC or EIRB.

For each effect for each VEC assessed:

1. Determine if a known threshold is exceeded, if the project does not conform with the objectives of the CCPs, and if the project directly overlaps a specific site of value (e.g., a waterfowl nesting site). If any of these are true, there is an increased likelihood of a significant effect. Review the criteria to be considered by the EISC and EIRB (Appendix A3) and ensure that questions relevant to your project and its effects are answered to the extent possible. The more of these questions or criteria you answer in such a way as to indicate a possible problem, the more likely the reviewer will consider your project with increasing concern.
2. Describe the magnitude of the effect. The magnitude is the degree of change your project has caused, and all projects caused, based on whatever you are measuring (referred to as the measurable parameter, such as habitat potential, a concentration of an air emission, or noise in decibels). For example, if your project causes a loss of more than 10 percent of potential habitat for the assessed species, the magnitude would be high. For example, a magnitude change of less than 1 percent could be considered low, 1 to 10 percent as moderate, and greater than 10 percent as high. If you cannot measure the change using numbers derived from an analysis, then use best judgement. It may help to use the concepts of zone of influence and disturbance factors to characterize your project's effects, particularly on wildlife and for gaseous and liquid emissions.
3. Explain the current state of the VEC in terms of trends. For example, is the species increasing in number, decreasing, or is there no change?
4. Use Table 5-4 (below) to identify the class of effect. A class is a ranking that reflects a degree of concern based on the combination of magnitude and trend. The classes are also defined below. Do this for both the project's own contribution to overall effects, and to the overall effects due to all projects. Your project is not necessarily threatened if the overall class suggests a problem with the VEC, although such a situation does strongly suggest that a VEC is in trouble. Note that the definition of classes do include difficult questions (i.e., related to long-term sustainability); however, it is acceptable to answer these questions based on clearly stated and defended best judgement. Also, and most importantly, the classes depend considerably on clearly defining an appropriate level of management response. This is in recognition of typical limited available data and uncertainties, especially as is often the case for wildlife species.

5. State your conclusion on significance (i.e., "significant" or "not significant"), using the following questions (by now, you have already done questions 1 and 2, but they are included to make sure you have followed through). Summarize what you have done using the screening matrix in Appendix A2.

Question 1: Your project has a measurable effect on a VEC (i.e., there is an effect).

Question 2: Your project's effect acts in a cumulative fashion with the effects of other past, present or future projects and activities (i.e., there is a cumulative effect).

Question 3: Your project's effect, in combination with those other projects and activities, shifts the VEC to an unacceptable state (i.e., there is a significant effect). "Unacceptable" is defined by whatever measure is applicable and appropriate for that VEC.

If (3) is true, one of two conclusions can then be reached that clarify the contribution of your project to those effects:

Question 3a: Your project's contribution to cumulative effects is responsible for causing that unacceptable shift to occur. If yes, then your project's contribution to cumulative effects is significant.

Question 3b: Other project contributions are already responsible for the unacceptable state of the VEC. In this case, your project is contributing incrementally to already significant cumulative effects. Contributions by your project therefore may or may not be significant, depending on the degree of change resulting from your project and/or land use priorities for the region.

Table 5-4 Determination of Class

Magnitude of Change to Benchmark[1]	Trend in VEC[2]	
	Positive	**Negative or Neutral**
Low (< 1%)	**Class 3**	**Class 3**
Moderate (1 to 10%)	**Class 3**	**Class 2**
High (> 10%)	**Class 2**	**Class 1**

[1] The benchmark is whatever point in time you are comparing against (e.g., pre-disturbance to peak operations). The % values may be modified to reflect more precise known indicators of magnitude (e.g., based on an odour threshold for an emitted volatile organic compound, minimum size of a caribou herd, annual hunting quota).

[2] A positive trend reflects an improving change in the status of the VEC. Classes are defined below:

Class 1 Effect: The predicted trend in the measurable parameter under projected levels of development could threaten the sustainability of the VEC in the study area, and should be considered of management concern. Research, monitoring and/or recovery initiatives should be considered under an integrated resource management framework. Any negative change in VEC value of greater than 25% from benchmark is considered to be a Class 1 effect, regardless of VEC trend at the time of the assessment.

Class 2 Effect: The predicted trend in a measurable parameter under projected levels of development will likely result in a decline in the VEC to lower-than-baseline but stable levels in the study area after project closure and into the foreseeable future. Regional management actions such as research, monitoring and/or recovery initiatives may be required if additional land use activities are proposed for the study area before project closure.

Class 3 Effect: The predicted trend in the measurable parameter under projected levels of development may result in a decline in the VEC in the study area during the life of the project, but VEC levels should recover to baseline after project closure. No immediate management initiatives, other than requirements for responsible industrial operational practices, are required.

5.5 What is done if the project proceeds? (follow-up)

Follow-up refers to the proposed (or ongoing) monitoring work that will be undertaken following project approval. Follow-up may be used to verify:

- the accuracy of predicted environmental impacts and contribution to cumulative effects (particularly where there is uncertainty as to the probable severity of the predicted effect or there are limited data to support analysis of the effect)
- the effectiveness of mitigation implemented for the project in reducing and managing potential project-specific and cumulative effects.

Proponents should clearly identify what follow-up activities they plan to undertake. Details should be provided on:

- parameters that will be measured
- methods and equipment that will be used
- location and timing of all surveys
- personnel who will conduct the follow-up monitoring, including involvement of HTC members and/or local technical assistants and specialists
- how results of the follow-up monitoring will be used to (1) revise impact predictions, (2) modify the project, or (3) modify the proposed mitigation program.

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Appendix A1 Assessment checklist

Use the following as a checklist for your assessment:

1. Collect and prepare your data ☐
2. Describe your project's actions ☐
3. Identify VECs possibly affected by your project, both environmental and cultural ☐
4. Identify periods of time in which project activities occur, and if also during those times the VEC is present at the project site ☐
5. Identify effects on those VECs ☐
6. Characterize what is happening around your project that may influence those VECs: ☐
   - list special features that may be directly affected (e.g., protected areas, critical wildlife habitat, unique landscape features, nearby occurrence of listed (e.g., rare, endangered) species
   - identify if the project area is already heavily disturbed
   - identify issues of concern (e.g., access proliferation, haze, noise)
   - identify any thresholds for the various environmental disciplines (i.e., air, water, soils, fisheries, vegetation, wildlife, land use)
   - identify any land use restrictions or management objectives
   - identify typical extent of effects (using suggested distances)
7. List other past, present and future projects and activities that may affect the same VECs. ☐
8. Identify any effects that act cumulatively with those other projects and activities ☐
9. Identify if mitigation is possible for each cumulative effect, describe the mitigation, and state the anticipated degree of success for that mitigation. ☐
10. Determine the degree of interaction for project-specific effects and the significance of that effect. ☐
11. Determine the degree of interaction for cumulative effects and the significance of that effect. ☐
12. State all assumptions and uncertainties associated with your data, analysis, mitigation and significance. ☐

Appendix A2 Screening matrix

1	2	3	4	5	6	7	8	9		10	11	12
VEC	Project-specific effect		Is there a possible overlap with other projects/activities?		Is there a cumulative effect on the VEC?	Effects Management		Probable Trend of VEC	Effect Type	Estimated Magnitude of Effect	Class of Effect	Significance
	Description	ZOI	Spatial	Temporal		Project-specific	Regional					
									Project			
									Overall			
									Project			
									Overall			
									Project			
									Overall			
									Project			
									Overall			
									Project			
									Overall			

Explanation of columns

1) VEC=Valued Ecosystem Component (includes cultural components)
2) Describe effect
3) ZOI= Estimated Zone of Influence (e.g., in metres or kilometres)
4) Spatial overlap (i.e., effect occurs at the same place) of your project effect on VEC with other project effects on same VEC
5) Temporal overlap (i.e., effect occurs at the same time) of your project effect on VEC with other project effects on same VEC
6) Answer Yes (Y) or No (N) if there is now a cumulative effect
7) Describe any effects management (e.g., mitigation) you are committing to for your project
8) Describe regional mitigation that you are committing to be involved in, or as a recommendation that such management be done
9) Describe the trend of the VEC (i.e., positive, neutral or negative)
10) Describe the magnitude of the change caused by your project on the VEC (e.g., as a % change, or as Low, Moderate or High)
11) State the class of effect as [Class] 1, 2 or 3, based on the class matrix
12) State the significance conclusion as significant (S) or not significant (NS)

Class Matrix

Magnitude of Change to Benchmark	Trend in Resource	
	Positive	Negative or Neutral
Low (< 1%)	Class 3	Class 3
Moderate (1-10%)	Class 3	Class 2
High (> 10%)	Class 2	Class 1

Explanation of Rows

1) First row for each VEC: provide all information shown, then identify project-specific contribution to magnitude, class and significance
2) Second row for each VEC: only provide overall (i.e., as a result of all projects) contribution to magnitude, class and significance

Appendix A3 Significance criteria by the EISC and EIRB

Environmental Impact Screening Committee

Determination Of Potential For Significant Negative Environmental Impact

In determining the potential for significant negative environmental impact of proposed developments, the EISC considers, for example, the following questions:

1. Is there a conflict with the Inuvialuit CCPs or traditional Inuvialuit harvesting?
2. Is there a conflict with wildlife management plans developed through the Inuvialuit co-management process?
3. Is there the potential to exceed territorial and/or federal air and water quality standards?
4. Does the proposed development have the potential to exceed established activity threshold levels?
5. Is the proposed development in land use category C, D or E lands (as identified in Inuvialuit CCPs or the Regional Land Use Plan for the Mackenzie Delta-Beaufort Sea Region)?
6. Are there unresolved environmental issues either related to the proposed development or within the ISR?
7. Is there the potential for significant habitat loss, disturbance, or population decline for any species with special conservation status, keystone species or species harvested by the Inuvialuit, as determined by the WMAC (Northwest Territories and/or North Slope) and/or FJMC?
8. Does the proposed development encroach on areas with particularly high biodiversity potential?
9. Does the EISC lack confidence in the proposed mitigation?
10. What are the cumulative effects of the proposed development?

from EISC Operating Guidelines and Procedures – February 1999.

Environmental Impact Review Board

General Criteria Used By The Environmental Impact Review Board To Guide Its Decision Making

1. Community values and land use practices recommended in the CCPs prepared by the communities of Aklavik, Holman, Inuvik, Paulatuk, Sachs Harbour, and Tuktoyaktuk.
2. Severity of potential impacts:

   a) Effects associated with a development disturbance not likely to change the reproduction or survival rate of individuals or the productive capacity of habitat will be considered insignificant.

   b) Effects associated with a development disturbance that are likely to impact the reproduction of a population for a period but, in the long term, would permit recovery of the population are considered significant.

c) Effects associated with a development disturbance that are likely to permanently impact the reproduction of a population are unacceptable.

3. Impacts which exceed federal or territorial air and water standards are unacceptable.
4. The existence of current wildlife compensation plans between a developer and the Inuvialuit of a community of the ISR assist the EIRB in judging the sincerity of a developer to deal with unexpected wildlife losses.
5. The adequacy of the relevant regulatory agency's ability to ensure compliance with commitments and approval conditions.
6. The degree of certainty there is in the prediction of the impacts and the irreversibility of those impacts.

from EIRB Operating Procedures – June 18, 2001.