ASSESSING THE APPLICATION OF DECISION ANALYSIS IN STAKEHOLDER CONSULTATION IN THE MINING INDUSTRY

by:

ANDREW THRIFT

B.A.Sc., The University of British Columbia, 2000

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Abstract

Earning and sustaining a "social license to operate" is of critical importance to the mining industry. Aligning mining practice with societal expectations of sustainability and public participation is crucial to achieving this aim. Multi-stakeholder Structured Decision Processes based on decision analysis are promising tools for effective stakeholder consultation, but have seen very little application in the mining industry. This innovative approach involves stakeholders in collaboratively building a structured decision framework that is transparent and grounded in principles of effective decision making.

This thesis assesses the effectiveness of using decision analysis in consultation by evaluating a case study consultation process regarding the optimization of a tailings management plan at the Ekati Diamond Mine in the Northwest Territories, Canada. This represents the first time a decision analysis-based process has been used for project-based consultation with wide stakeholder involvement in the Canadian mining industry. The forces driving public participation and criteria for its evaluation, as well as the decision analysis approach are discussed. The case study process, involving the use of a decision analysis tool called Multiple Accounts Analysis (MAA), is evaluated from the perspective of its participants (including mining company staff) based on questionnaires and interviews using the critical incident technique.

A strong majority of respondents were satisfied with the outcome of the process and an even greater majority recommended future use of MAA. Strength and weakness themes generated from inductive analysis of the data are discussed in detail. The most important strength themes are learning, engagement, facilitation and representation of values, and the most important weakness themes are unequal and insufficient participation, trust and transparency, and time constraints and time management. These themes are compared with the public participation evaluative frameworks found in the literature, which are based on government rather than corporate public participation efforts. Practical recommendations for improving the application of MAA to consultation, both at Ekati and at other mines, are given and drivers for further application of Structured Decision Processes in the mining industry are discussed.
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<th>Full Form</th>
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<tbody>
<tr>
<td>BHPB</td>
<td>BHP Billiton</td>
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<tr>
<td>CEAA</td>
<td>Canadian Environmental Assessment Agency</td>
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<tr>
<td>COI</td>
<td>Community of Interest</td>
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<tr>
<td>DFO</td>
<td>Department of Fisheries and Oceans (federal agency)</td>
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<td>EA</td>
<td>Environmental Assessment</td>
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<td>EARP</td>
<td>Environmental Assessment Review Panel</td>
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<td>EC</td>
<td>Environment Canada (federal agency)</td>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>ENGO</td>
<td>Environmental Non-Governmental Organization</td>
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<td>IAP2</td>
<td>International Association for Public Participation</td>
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<td>IBA</td>
<td>Impact Benefit Agreement</td>
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<tr>
<td>IEMA</td>
<td>Independent Environmental Monitoring Agency</td>
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<td>INAC</td>
<td>Indian and Northern Affairs Canada (federal agency)</td>
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<td>LLCF</td>
<td>Long Lake Containment Facility</td>
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<td>MAA</td>
<td>Multiple Accounts Analysis</td>
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<tr>
<td>MAC</td>
<td>Mining Association of Canada</td>
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<tr>
<td>MVEIRB</td>
<td>Mackenzie Valley Environmental Impact Review Board</td>
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<tr>
<td>MVLWB</td>
<td>Mackenzie Valley Land and Water Board</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
</tr>
<tr>
<td>NIMBY</td>
<td>Not In My Back Yard</td>
</tr>
<tr>
<td>NWT</td>
<td>Northwest Territories</td>
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<tr>
<td>PK</td>
<td>Process Kimberlite</td>
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<td>PR</td>
<td>Public relations</td>
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<td>RGC</td>
<td>Robertson Geoconsultants</td>
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<tr>
<td>RWED</td>
<td>Resources, Wildlife &amp; Economic Development (territorial agency)</td>
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<tr>
<td>SDP</td>
<td>Structured Decision Process</td>
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<td>SIA</td>
<td>Social Impact Assessment</td>
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<td>TK</td>
<td>Traditional Knowledge</td>
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<tr>
<td>TSM</td>
<td>Towards Sustainable Mining (initiative of MAC)</td>
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Chapter 1 Introduction

The mining industry in Canada and around the world is undergoing a transition largely influenced by society’s increasing emphasis on sustainable development. This poses unique challenges for an extractive industry reliant on non-renewable resources.

The mining industry has been stigmatized by the public and recognizes that its future viability is dependent on its ability to demonstrate that it is a net contributor to society. This focus on the “social license to operate” has resulted in most mining companies developing sustainability and corporate social responsibility (CSR) policies with an increasing emphasis on measurable results. Mining companies have committed themselves to stakeholder engagement and consultation as vital parts of this effort, but often appear to lack the experience and skills to engage stakeholders in a mutually-satisfactory manner. The mining industry needs tools for stakeholder engagement that can meet the challenge of both achieving corporate objectives and facilitating meaningful, substantive stakeholder involvement.

The field of decision analysis prescribes an approach for making good decisions under conditions of complexity and uncertainty. The range of decision analysis techniques has evolved and expanded from accommodating a single decision maker to facilitating the involvement of multiple parties in a decision. Structured Decision Processes (SDPs), based on the principles, process and tools of decision analysis, are multi-stakeholder processes that facilitate broad involvement and transparent decision-making. They hold the promise of helping parties with varied interests in the mining industry to collaboratively make decisions that are of high quality and have broad support. SDPs have been used successfully in other natural resources industries such as electrical power generation, but have had very limited application in the mining industry. There has not been any rigorous evaluation of mining SDPs to date that could assess whether the great promise of SDPs actually translates into positive outcomes “on the ground.” This type of evaluation would help mining companies and their stakeholders to decide whether to employ such processes in the future. The evaluation of the case study at the Ekati
Diamond Mine examined in this thesis, accompanied by a literature review of the historical and conceptual background of public participation and decision analysis in the mining industry, is aimed at making a significant contribution towards bridging that gap.

1.1 *Purpose and objectives*

The purpose of this thesis is to assess the potential contribution of SDPs to consultation in the mining industry. Specific objectives include:

1. Describe the growth of public participation and sustainable development thinking in the mining industry and present a rationale for their continued importance;
2. Characterize public participation and decision analysis, and their synthesis in SDPs;
3. Document the state of policy and practice of public participation and SDPs in the mining industry;
4. Examine the literature on evaluating public participation and develop an evaluation approach suitable for corporate consultation activities such that of the case study;
5. Provide a rich description of the case study context so that a reader may understand its particular and general characteristics;
6. Evaluate the case study consultation process at the Ekati Diamond Mine from the perspective of its participants, and compare these results with the decision analysis and public participation literature; and
7. Make recommendations on the future application of SDPs in consultation in the mining industry, both in terms of improving the processes themselves and also how they fit into a comprehensive approach to mine-stakeholder relations.

My hope is that beyond having academic merit, this thesis will be useful to managers and public participation practitioners designing and facilitating stakeholder consultation in the mining industry, as well as engineers and scientists who are called upon to contribute their knowledge and experience to such processes.
1.2 Study approach

This work addresses the broad question of “Are Structured Decision Processes an effective methodology for involving stakeholders in consultative decision-making in the mining industry?” through a literature review and a participant-centred evaluation of a case study. The literature review describes the growth of public participation in society in general and in the Canadian mining industry in particular. It also discusses the selection of criteria for evaluating public participation and presents an introduction to decision analysis and its application in the mining industry. All of these topics provide a background for understanding the case study at the Ekati Diamond Mine in the Northwest Territories, Canada. The case study involves the use of Multiple Accounts Analysis (a particular type of SDP) at the Ekati Diamond Mine in the Northwest Territories, Canada, as a methodology for involving stakeholders in the process of selecting an optimized tailings management plan. The case study represents the first time a SDP has been used for project-based consultation with wide stakeholder involvement in the Canadian mining industry and as such provides an excellent opportunity to assess the effectiveness of this approach. The study employed mostly qualitative research methods, and focused on evaluating the consultation process from the perspective of the participants through questionnaires and interviews.

1.3 Scope and assumptions

Although the literature review examines public participation and decision analysis in general, with a focus on corporate rather than government-initiated applications, the geographical scope is limited to the Canadian context, with particular reference to mining in Canada’s North. The individual case study approach was selected because it is unique and “data-rich,” permitting empirical as well as conceptual analysis of the research question. The specificity of the case study perhaps limits the generalizability of the findings, although many characteristics of the case study parallel circumstances within the mining industry in Canada and abroad.
1.4 Thesis structure

This thesis consists of the following six chapters:

Chapter One – Introduction. The introduction briefly describes the justification for this work, identifies its purpose and objectives, and outlines the information contained herein.

Chapter Two – Literature Review. This chapter introduces the rationale and significance of the study and reviews selected literature on public participation and its practice in the Canadian mining industry, evaluation of public participation and decision analysis, and the application of SDPs in the mining industry.

Chapter Three – Case Study: Ekati Diamond Mine Tailings Management Multiple Accounts Analysis. This chapter describes the case study at the Ekati Diamond Mine. An overview of the biophysical, socioeconomic and regulatory context of the mine is presented. The tailings management decision process regarding the operation of the Long Lake Containment Facility is discussed along with the stakeholders involved and nature of the Multiple Accounts Analysis process used to guide the consultation process on the decision.

Chapter Four – Methodology. This section describes the methodological approaches and techniques employed for participant evaluation of the Ekati LLCF Multiple Accounts Analysis consultation process, which included participant observation, a questionnaire at the conclusion of the process, and interviews with participants using the critical incident technique. The research methodologies used in this study are primarily qualitative.

Chapter Five – Results. Results of the observation, questionnaire and interviews regarding the case study are detailed in this section.

Chapter Six - Discussion. The final chapter discusses the results and their implications for the use of SDPs like Multiple Accounts Analysis at Ekati specifically, and in the Canadian mining industry generally. Recommendations based on participants’ feedback
from the data collected for improving the application of these methods to consultation are proposed. The themes from the case study are compared to public participation evaluative frameworks found in the literature and topics for further research are suggested.
Chapter 2 Literature Review

This chapter introduces the rationale and significance of the study and reviews selected literature on public participation and its practice in the Canadian mining industry, evaluation of public participation and decision analysis and the application of SDPs in the mining industry.

2.1 Public participation in the Canadian mining industry

Although this thesis is focused on an applied methodology, it is important to give some context of the sociopolitical environment in which it is applied and the drivers for its adoption. The intent is to understand the part (in this case, one method of stakeholder involvement) in the context of the whole (the mining industry responding to societal forces). The following section gives a brief overview of public participation and its importance for the mining industry, then addresses the current state of practice of public participation in the Canadian mining industry.

2.1.1 Drivers for public participation in the mining industry

The mining industry, like any other industry that desires to prosper well into the 21st century, has evolved and adapted to changes in society (Humphreys, 2000). Changing societal values towards the natural and human environment necessitate progressive corporate policies that in turn require new tools or methodologies to be implemented and evaluated successfully. While the central thrust of this thesis is the evaluation of one such tool with a specific application – stakeholder involvement in mining decisions – it is helpful to understand the historical and sociopolitical context in which this tool is applied. This facilitates an assessment of whether the tool in question is consistent with the overarching normative societal values driving the change, as well as being pragmatic and effective “on the ground” for its primary users. For this reason the next section of the thesis presents some of the historical developments that are particularly pertinent to a discussion of stakeholder involvement in the mining industry, with particular reference to the Canadian context.
The environmental movement
The environmental movement in Western society that began in the 1960’s has had a profound effect on the way mines are developed, operated and closed. The first publication of Rachel Carson’s seminal book ‘Silent Spring’ in 1962 raised public awareness of human impacts on the earth’s ecological systems, and the role of corporations in causing many of the impacts. As popular respect for the environment grew, increasing pressure was brought to bear on mining companies to be intentional about characterizing and minimizing the environmental impacts associated with their operations. This resulted in the introduction of comprehensive environmental impact assessment (EIA) of mining projects in 1970s and the concept of “planning for closure,” among other advances. EIA is a process to predict the environmental effects of proposed projects before they are carried out that facilitates avoiding or mitigating negative effects and incorporating environmental factors into decision making (Canadian Environmental Assessment Agency, 2005). Improving environmental management of mines, as with any change in paradigm or practice, had both its progressive champions and its reluctant laggards, who dismissed environmentalism as a passing fad. Modern mining practice has proven these naysayers wrong. Today, environmental management is entrenched in government regulations, corporate policy and, most importantly, in day-to-day mining operations.¹ Despite these improvements, the Canadian public remains wary of the industry’s environmental performance (MacDonald, 2002; McAllister, Scoble, & Veiga, 1999; MiningWatch, 2000).

Sustainable development
The seeds of another wave of change in the mining industry were planted in 1987 with introduction of “sustainable development” into the popular lexicon with the publication of the Brundtland report. This report of the United Nations World Commission on Economic Development defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their

¹ Note that although this is certainly true for major publicly-listed mining companies, the environmental practice of some smaller privately-owned mines and artisanal and small-scale miners (ASM), particularly in developing countries, is generally poor, causing some significant local environmental impacts.
own needs (1987, p. 43)." This statement encompasses principles of equity and fairness, taking a long-term view by applying the precautionary principle and entails taking a systems approach to considering the interconnected challenges in the environmental, economic and societal domains. The precautionary principle states that a lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation (United Nations, 1992).

The conceptual development of this idea can be traced in the progression of 20th century environmental thought and shares an ethos of living in harmony with nature consistent with indigenous traditions around the world (Mebratu, 1998). The innovation of sustainable development was proposing the reconciliation of environmental protection and economic growth, goals previously assumed by many to be mutually exclusive. This also had the effect of raising the profile of social issues alongside environmental concerns as a challenge to the dominance of economic issues in the head offices of mining companies. It is argued that the protection of the environment has an unavoidable social dimension, and that there is very little justification for treating environmental and social issues in isolation (Carter, 1999).

**Growing importance of social issues**

Although public concern for the environment is not diminishing, the social implications of large mine development have displaced environmental concerns as the primary public concern, at least in developing countries (World Bank, 1998), due to several separate developments. First, it has been generally accepted that such mine development will employ "best practice" techniques with more environmentally friendly technology. Second, the globalization of the mining industry has resulted in exploration outside of traditional mining areas and into remote areas that are often largely settled by indigenous communities with different values and lifestyles than those of Western culture (including mining companies). The significance of this development is heightened by a greater international acceptance of the intrinsic value of indigenous cultures, in contrast to the

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2 There have been many definitions proposed for "sustainable development", many reflecting the perspective and bias of the party proposing it, and this is an ongoing debate. However, the Brundtland Report definition is the most often quoted version. It is most frequently used by mining companies in their corporate reports (see Section 2.1.3 on corporate policies).
assimilation rhetoric of the recent past. The importance of Aboriginal communities to the burgeoning activity of the mining industry in northern Canada provides ample evidence of these trends.

Accordingly, greater attention is being placed on social issues in mining, from a sustainability perspective. However, treatment of social issues still lags environmental issues (Hilson, 2000); although Social Impacts Assessment (SIA) is “quickly becoming the rule rather than the exception” for mining companies (World Bank, 1998, p. 7), they lack the policy framework and consistency of EIAs (Joyce & MacFarlane, 2001). B.E. Harvey, the Chief Advisor on Aboriginal and Community Relations with Rio Tinto, one of the world’s largest mining companies, makes this statement about the evolving skill requirement of mining professionals:

Whilst senior management appreciate the need for social competencies to further the transition to sustainable development and sustainable relationships, there remain many mid-level mining executives who retain a view that a narrow spectrum of technical competence is all that is necessary to succeed. Whilst not advocating comprehensive social science training for mining professionals, some grounding in cultural preparation and cultural awareness (the former preparing the way for the latter) will greatly benefit the sustainable miner. Intelligence and energy and being in charge of a mine are no longer enough to handle community issues. If nothing else, managers should at least be able to read and understand the reports prepared by social scientists carrying out Social Impact Assessments. (Harvey, 2002, p. 4)

A rapidly developing area that has implications both for resolving environmental disputes and managing social impacts is that of public participation. Along with SIA, the methods and approaches of public participation, while having great promise, have not been operationalized with the same consistent rigour as environmental management tools.

In addition to raising the profile of social issues, a further corollary of sustainable development with particular relevance to this thesis is that sustainable development must include effective citizen participation in decision making, above and beyond changes in legislation and regulation. The Brundtland report makes explicit the importance of public
participation in harmonizing the protection of the environment and the common interest of its human inhabitants:

The law alone cannot enforce the common interest. It principally needs community knowledge and support, which entails greater public participation in the decisions that affect the environment. This is best secured by decentralizing the management of resources upon which local communities depend, and giving these communities an effective say over the use of these resources... (World Commission on Environment and Development, 1987).

The growth of public participation
Momentum for public participation was also building during the same time as the environmental movement and the dawn of sustainable development thinking. In the United States, federal anti-poverty efforts in the 1960s began to emphasize broad participation by citizens to counter the disproportionate impacts of previous urban renewal programs on low-income residents (Thomas, 1995). Dorcey (2003) characterizes the growth of public participation in Canadian governance systems, particularly in the management of natural resources, in terms of “waves of innovation.” The first wave in Canada shortly followed American initiatives in the mid 1960s and involved governments at the federal, provincial and local levels experimenting with the use of a variety of communication and participatory techniques including information brochures, media releases, citizen surveys, public hearings, workshops, task forces and advisory committees. This wave lost momentum in the mid 1970s due to a weak economy and perceptions of these initiatives as being unsuccessful in resolving issues, time consuming and costly.

A second wave of innovations began in the second half of the 1980s with renewed interest in environmental matters in the new context of sustainable development. This wave was not only characterized by new tools and techniques such as multi-stakeholder, conflict resolution and consensus building processes but also by the fact that they were being initiated by business and civil society as well as government and commonly involved stakeholders from all of these sectors. The Whitehorse Mining Initiative, a two-year national consultation process to develop a strategic vision for the Canadian mining
industry that concluded in 1994, embodied these characteristics. This consensus-based process was launched by the mining industry but had significant support and participation from officials from federal, provincial and territorial governments, labour unions representing mining workers, environmental groups, and Aboriginal peoples (Natural Resources Canada, 2005).

Despite being used to address an expansive range of issues as a part of governance processes at all levels, enthusiasm for public participation began to wane in the mid-1990s, again under the weight of criticism that they were “too lengthy and costly and of limited value in terms of reaching and implementing agreements that met the interests of the diversity of stakeholders” (Dorcey, 2003). The new millennium seems to have ushered in a third wave in response to the need to revitalize democratic governance processes to understand, make choices and forge a willingness to act on complex and pressing sustainability issues. Fischhoff (1995) chronicles the same trend towards public participation in the closely related field of risk communication.

Yosie and Herbst’s (1998) study of stakeholder processes in environmental decision-making concluded that public participation was not a “passing fad” but rather the product of the forces described in the previous section:

The increased use of stakeholder processes over the past decade represents a societal interest in more interactive forms of decision making. Rather than a transitory phenomenon, this development reflects a culmination of a series of environmental, political, societal, and technological developments that have begun to yield significant changes in the methods of making environmental decisions (p. 1).

2.1.2 Characterizing public participation
Public participation developed initially in parallel with the environmental movement, but soon became closely associated with both the environmental movement and sustainable development. Changes in society at large and specific challenges of the mining industry

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3 Much of the literature examined in this thesis is from the area of environmental public participation. Environmental issues are important to mining stakeholders, so this knowledge is applicable to this thesis, although public participation is not by any means limited to environmental issues.
have contributed to its growing importance, and there are a number of reasons why mining companies are taking public participation seriously. Much like "sustainable development," there is some confusion regarding the definition of "public participation" and its near-synonyms. This is reflective of the breadth of application of public participation, whose activities can be thought of as laying along a continuum (although the nature of the continuum or typology is also the source of debate).

Defining public participation
Public participation has been defined as "forums for exchange that are organized for the purpose of facilitating communication between government, citizens, stakeholders, and interest groups, and businesses, regarding a specific decision or problem." (Renn, Webler, & Wiedemann, 1995, p. 2). Other definitions are more direct about the role of stakeholders in influencing and not merely communicating about decisions. The extent to which stakeholders have a legitimate right and are effectively able to influence decisions is a source of debate. Public participation was initially concentrated on decisions made by government agencies, and much of the literature is based in this area. The same issues have been addressed by the corporate sector in stakeholder theory, which is discussed in Section 2.1.2. In order to further explore what public participation means, it is necessary to digress to a discussion of the various terms used to describe what I have thus far called public participation.

Although "public participation" is the most widely-used term in research literature to describe the involvement of stakeholders in agenda setting and decision-making (Chess & Purcell, 1999), other terms such as "stakeholder engagement" are also commonly used. These terms may be used synonymously or their usage may be intended to convey subtle yet significant differences in meaning. This section presents the range of terminology used in the literature (Table 2-1) and clarifies and justifies the choice of terminology used in this thesis.
Using key words such as “citizen” or “public” or “civic” or “community” to describe the agents involved generally implies the inclusion of everybody within a particular jurisdiction (e.g., country, town) whereas “stakeholder” may “limit the former to only those who have a specific interest in the issue as opposed to being generally interested as citizens” (Dorcey, 2003). The prevalence of these terms evidences the primary arena for discussion of these issues as government-citizen relations. A “stakeholder” is defined from a corporate perspective as an individual or group who can affect or who is affected by a corporation’s activities (Svendsen, 1998) and may in some cases be used to identify only non-governmental interests or imply that the participants represent discrete, identifiable constituencies (Beierle, 1998). Connor (1999b) warns that a narrow focus on stakeholders that gives no voice to the “residual” population in a community or region is dangerous. He advocates that every group or “public” has an opportunity to become informed and provide input, albeit not with uniform programs or level of influence. The usage of the term “community of interest” (COI) is more recent and broader in scope. It refers to a group that is united by shared interests, rather than by having a “stake” in a particular issue, as is connoted by “stakeholder.” COI is a preferred by some Aboriginal peoples who rightly regard themselves as having more than a “stake” in mining activities in their traditional territories (Aboriginal and treaty rights receive special recognition in Section 35 of the Canadian Constitution Act, 1982 (Hipwell, Mamen, Weitzner, & Whiteman, 2002; Joseph, 2001)). COI also avoids negative associations with the “free-entry” system of staking mineral claims that has been associated with Aboriginal concerns and title (Bankes & Sharvit, 1999; Hipwell et al., 2002; Indigenous Corporate Training, 2003).
The descriptive terms “involvement” or “engagement” commonly entail a more active and influential role for stakeholders while “participation” may imply a more passive role. The term “consultation,” to a yet greater degree than “participation,” may indicate a purely advisory process, with stakeholders merely being informed, as opposed to allowing for direct contribution to decision-making. Note that there is debate over the definitions and implications of these terms, and distinctions mentioned above are not universally recognized but rather depend on the perspective of the user (Joyce & MacFarlane, 2001; Whiteman & Mamen, 2002). Confusion and differences in understanding of the commonly used terms among stakeholders need not be a hindrance to successful dialogue and collaboration so long as these differences in meaning are expected and clarified to foster fresh insights (Dorcey, 2003).

The terms “stakeholder,” “consultation” and “public participation” are used in this thesis. Although I personally believe that “community of interest” is a better term than “stakeholder” for the reasons stated above, the latter has widespread acceptance industry vernacular (although the Mining Association of Canada4 is promoting the use of COI instead). “Stakeholder” and “public participation” are also consistent with the larger body of literature in this area. The term “consultation” is also used in Chapter 3, Chapter 4 and Chapter 5 since this is the term most commonly used by those involved in the Ekati Diamond Mine case study.

Although public participation shares some common ground with SIA and public relations (PR), they have important distinctions and should not be confused. Public participation is focused on identifying stakeholder interests and concerns and deals with all the significant issues related to a decision, including social ones. It entails extensive and ongoing contact with all stakeholders throughout a project. SIA includes short-term contact with stakeholders for the purpose of contributing to the evaluation of social or socio-economic aspects of the project by qualified social scientists. Its product is a

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4 The Mining Association of Canada is a national organization that promotes and lobbies on behalf of the Canadian mining industry. It has been involved in developing initiatives with and for its member companies such as Towards Sustainable Mining (TSM), which has external outreach and dialogue as one of its central components.
specialist report that makes recommendations for maximizing benefits and reducing negative social impacts (Chamber of Mines of South Africa, 2002).

Public relations, like public participation, is based on principles of effective communication. However, public participation must present objective information, both negative and positive, regarding a project and its proponent, and also emphasizes enabling stakeholder contributions to improve decision-making. PR focuses on distribution of information aimed at changing attitudes towards the project and is usually conducted by the proponent itself. Confusing these two functions is common and can lead to stakeholders rejecting the public participation process as "white-wash" or "rubber-stamping." Public participation is often conducted by an independent agency to increase its credibility in the eyes of stakeholders and distinguish it from PR (Chamber of Mines of South Africa, 2002).

Typologies of public participation
Public participation covers a whole range of objectives and tools, and numerous authors have proposed typologies for understanding its full spectrum of activities. Typologies help us by providing us with a common language with which we can discuss public participation approaches and tools. The seminal typology, Arstein's (1969) "Ladder of Citizen Participation," was written from an activist perspective, critiquing urban citizen participation efforts of the day and focusing on the redistribution of power as an essential element of citizen participation. The ladder consequently considers participation programs that do not share decision-making powers with citizens (i.e., the lower rungs of the ladder) as being of little value, classifying them as degrees of "non-participation" or "tokenism."5

Subsequent typologies have evolved to take a less absolutist stance, acknowledging that different levels of participation, from basic sharing of information all the way to delegated decision-making, may each be appropriate for particular decisions in varying contexts (Beierle, 1998; Connor, 1999a; Dorcey, Doney, & Rueggeberg, 1994; IAP2,

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5 Tokenism is defined as "the policy or practice of making only a symbolic effort" (Merriam-Webster, 2004)
2000; Wilcox, 1994; World Bank, 1996), although their authors tend to agree that most decision makers would benefit from “moving up the ladder” to some extent. Wilcox (1994) states that “participation may work best for all concerned when each of the key interests – the stakeholders – is satisfied with the level of participation at which they are involved” (p. 9). These typologies typically use a horizontal rather than a vertical axis, since the relationship between different approaches or techniques is not hierarchical, and approaches on different parts of the spectrum may be employed simultaneously for different stakeholder groups.

The International Association for Public Participation (IAP2), an organization representing public participation practitioners, has developed a “Public Participation Spectrum” (shown in Figure 2-1) that reflects this pragmatic view, although IAP2’s core values statement emphasizes that the public should be given considerable degree of influence over both the process and outcome of shared decision-making (see Table 2-2).

Table 2-2 Core Values for the Practice of Public Participation (IAP2, 2004)

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<tbody>
<tr>
<td>1.</td>
<td>The public should have a say in decisions about actions that affect their lives.</td>
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<td>2.</td>
<td>Public participation includes the promise that the public's contribution will influence the decision.</td>
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<tr>
<td>3.</td>
<td>The public participation process communicates the interests and meets the process needs of all participants.</td>
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<tr>
<td>4.</td>
<td>The public participation process seeks out and facilitates the involvement of those potentially affected.</td>
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<td>5.</td>
<td>The public participation process involves participants in defining how they participate.</td>
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<tr>
<td>6.</td>
<td>The public participation process provides participants with the information they need to participate in a meaningful way.</td>
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<tr>
<td>7.</td>
<td>The public participation process communicates to participants how their input affected the decision.</td>
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The IAP2 spectrum provides a snapshot of current public participation practice, linking the goals of the various levels of public involvement with examples of common tools used for each.
### INCREASING LEVEL OF PUBLIC IMPACT

<table>
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<tr>
<th>INFORM</th>
<th>CONSULT</th>
<th>INVOLVE</th>
<th>COLLABORATE</th>
<th>EMPOWER</th>
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<tbody>
<tr>
<td>Public Participation Goal</td>
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<tr>
<td>To provide the public with balanced and objective information to assist them in understanding the problem, alternatives and/or solutions.</td>
<td>To obtain public feedback on analysis, alternatives and/or decisions.</td>
<td>To work directly with the public throughout the process to ensure that public issues and concerns are consistently understood and considered.</td>
<td>To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.</td>
<td>To place the final decision-making in the hands of the public.</td>
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### Promise to the public

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<tr>
<td>We will keep you informed.</td>
<td>We will keep you informed, listen to and acknowledge concerns and provide feedback on how public input influenced the decision.</td>
<td>We will work with you to ensure that your concerns and issues are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.</td>
<td>We will look to you for direct advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.</td>
<td>We will implement what you decide.</td>
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### Example tools

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<tr>
<td>• Fact sheets</td>
<td>• Public comment</td>
<td>• Workshops</td>
<td>• Citizen Advisory Committees</td>
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<tr>
<td>• Web sites</td>
<td>• Focus groups</td>
<td>• Deliberate polling</td>
<td>• Ballots</td>
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<tr>
<td>• Open houses</td>
<td>• Surveys</td>
<td>• Consensus-building</td>
<td>• Delegated decisions</td>
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<td></td>
<td>• Public meetings</td>
<td>• Participatory decision-making</td>
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Beierle (1998) presents a more detailed approach to matching tools with goals, describing the tools in terms of four characteristics, including:

- information flows;
- the degree of interaction among potentially opposing interests;
- the type of representation; and
- the decision-making role of stakeholders.

This typology is rooted in the government context and as such includes some techniques that do not directly apply to private sector public participation efforts. Figure 2-2 and Figure 2-3 present a graphical depiction of this typology defining common tools with respect to each of the four characteristics. Information flows can be one-way, with information flowing from stakeholders to the proponent in forms such as surveys and focus groups (Group A). Or, they can go in the opposite direction, with the proponent providing information to stakeholders through public notices or the provision of right-to-know information (Group C). Mechanisms employing two-way flows of information, such as advisory committees or mediations—offer varying degrees of opportunity for deliberation among participants (Group B). The degree of interaction among potentially opposing interests can range from none, as in the case of a survey, to high, as in the case of a multi-party mediation. The type of representation ranges from citizens representing themselves at a public hearing, to "representative" members of an advisory committee, to professional public interest or environmental group representatives engaged in a regulatory negotiation. The decision-making role of stakeholders can range from none, in the case of a focus group, to a direct decisional role in ratifying an agreement arrived at through mediation.

Multi-stakeholder SDP based on decision analysis (Section 2.3) is shown on Figures 2-3 and 2-4. This tool involves extensive face-to-face interaction among participants, who may include representatives of public or interest groups, as well as technical experts.

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6 For a more comprehensive list of public participation tools with practical tips for implementation, see the IAP2 Public Participation Toolbox, available at http://iap2.org/practitionertools/toolbox.pdf.
representing government and industry. The results of the process may be advisory or decisional.

**Figure 2-2** Typology of public participation tools with respect to degree of interaction and information flows (modified from Beierle, 1998)

**Figure 2-3** Typology of public participation tools with respect to type of representation and decision-making role (modified from Beierle, 1998)
Rationales for doing public participation

There are numerous drivers behind the rise in public participation in North American society. A root cause is a higher level of education: "As people become more educated, they ask for more involvement in the decisions that will affect their lives" (Thomas, 1995). Not only are levels of institutional educational achievement higher, but new information technologies, particularly the world wide web, have given concerned citizens rapid access to information about the issues that concern them, regardless of their geographical proximity (B.C. Round Table on the Environment and the Economy, 1994). The public's level of trust in institutions, both governmental and corporate, has diminished and fewer people believe that these institutions will genuinely serve their best interests without public intervention (B.C. Round Table on the Environment and the Economy, 1994; Yosie & Herbst, 1998). This phenomenon is particularly acute for transnational corporations (Hemmati, 2002), including most mining companies. The importance of individual rights and democratic tradition in North American society also reinforce the normative rationale that people should have meaningful input into the decisions that affect them (National Research Council, 1996). Government policy and legislation are changing in favour of greater participation, providing a "lagging" legal rationale for public participation to buttress the "leading" factors described above (Wilcox, 1994)

Apart from these contextual factors that favour greater public participation, there are a number of rationales why a corporation would choose to involve its stakeholders, related both to the quality of the decision-making process and outcomes and to the corporation's relationship with its stakeholders. Public participation can provide additional data for decision-making (Connor, 1999a; National Research Council, 1996); this data provides insight into local knowledge, often over a longer timeframe than the corporation's existing data and is generally available at minimal cost. The incorporation of Traditional Ecological Knowledge shared by Aboriginal communities into impact assessment and decision-making represents one of the innovative edges of this approach. The public also brings to the table a wide variety of perspectives and abilities that enhance the creative capacity of a corporation (Connor, 1999a; Dorsey et al., 1994). The importance of creativity to successful organizations is well established (Jalan & Kleiner, 1995;
Woodman, Sawyer, Griffin, & Ricky, 1993) and stakeholder perspectives can help mining companies to temporarily step outside of their standard technocentric, positivist worldview and envisage novel alternatives. Environmental decision-making has both technical and political dimensions, and public participation can provide insight on the goals and attitudes of stakeholders to ensure that final decisions are politically acceptable as well as technically adequate (Beierle, 2002; Connor, 1999a; National Research Council, 1996). A good decision is characterized not only by the selection of the optimal alternative but also by one’s ability to implement it. Working with stakeholders in a joint problem-solving frame to choose an alternative creates greater ownership on their part, facilitating the implementation of the chosen alternative (Gray, 1989). A review of 239 case studies of stakeholder involvement in environmental decision-making in the United States found evidence of stakeholders improving decisions over the status quo in the majority of cases, and further concluded that more intensive stakeholder processes are more likely to result in higher quality decisions (Beierle, 2002).

A good public participation process also encourages mutual education, allowing stakeholders to learn about the interests and procedures of the mining company, and builds valuable trust that is simply not attainable using a traditional public relations approach (Beierle, 1998). Capacity building both in terms of the technical issues surrounding an operating mine and its organizational and political considerations provide a foundation for more informed direct communication between a mine and its stakeholders (Connor, 1999a; Wilcox, 1994), instead of the reactive, sensationalized communication via third parties such as the media, NGOs (Non-Governmental Organizations) or regulatory agencies that often characterize mine-stakeholder relations. Public participation by no means guarantees the absence of conflict (nor would this extreme be a desirable outcome) between a mine and its stakeholders, but public participation is a valuable contributor to conflict resolution. The benefits of positive relationships with stakeholders with which an organization deals directly also include an improved reputation amongst the wider community (Humphreys, 2000).
Corporate perspectives on public participation
Government agencies and corporations have different motivations and needs for using public participation processes (Yosie & Herbst, 1998). Governments, who are elected with an explicit mandate to represent the interests of their electorate, have an obvious rationale to support public participation as a means of fulfilling their mandate, consistent with democratic principles. As a result, government agencies have been practicing public participation for much longer than corporations, and most of the literature is focused on this area. Similarly, public participation represents a logical extension of the mandate of development agencies and international financial institutions such as the World Bank Group to improve the living standards of people in the developing world. A normative rationale for corporations is much less apparent, so the ability of public participation programs to deliver net benefits for the corporation and its stakeholders is most germane. Furthermore, the extent to which stakeholders should influence decision-making (directly or indirectly) by a privately owned corporation, whose traditional mandate is to generate profits for its shareholders, is contentious. The opposing points of view are expressed in the business world by stockholder theory and stakeholder theory, respectively.

Proponents of stockholder theory, exemplified by conservative economist Milton Friedman, claim that corporations are designed to maximize wealth for their principals—the stockholders. He argues in his seminal 1970 article that managers are not equipped to decide what is good for the public and should leave “social responsibility” to governments, and declares that market mechanisms can be trusted to correct abuses of stakeholders (Friedman, 1970). Stockholder theorists would allow that stakeholder engagement may be warranted, but only if it is justified solely by the benefits it provides the company, such as improved employee recruitment and retention, or reduced opposition to new projects (which ultimately contribute to greater profits for shareholders).

7 The strength of this argument depends somewhat on one’s understanding of the nature of democracy. Managerial and popular perspectives represent opposite ends of the spectrum of how involved the public should be in government decision-making (Beierle, 1998).
Stakeholder theory, first popularized by R. Edward Freeman in 1983, emphasizes stakeholder engagement not only because of the long-term benefits it may afford a corporation, but also because of an underlying belief in the inherent dignity of stakeholders as persons. The impetus behind stakeholder theory was to try and build a framework that would help managers develop new strategic directions and create new opportunities in the midst of unprecedented levels of environmental turbulence and change. A stakeholder approach to strategic management draws on concepts in corporate planning, systems theory, corporate social responsibility and organizational theory. Its purpose is active management of the corporation’s relationships by understanding and responding to the interests of legitimate stakeholders (Donaldson & Preston, 1995; Freeman & McVea, 2001).

Stakeholder theorists not only suggest that stakeholders have an indirect influence on corporate strategy by virtue of a company’s commitment to social responsibility (i.e., the corporation’s understanding of stakeholder interests), but also encourage their direct participation in decision making. For example, Evan and Freeman (1993) propose the creation of a parallel stakeholder board of directors vested with the duty of care to manage the affairs of the corporation in unison with the interests of its stakeholders. While this proposal has never been implemented, empirical studies have shown increased stakeholder representation on the board of directors of American corporations (Luoma & Goodstein, 1999). Cameco, a medium-sized Canadian mining company, has an Aboriginal representative on their board of directors (Natural Resources Canada, 2005). Others emphasize the pursuit of collaboration with stakeholders, rather than managing stakeholder relationships as constraints to be minimized (Svendsen, 1998).

An examination of corporate policies and reporting seems to indicate the tide is turning in favour of a stakeholder approach (discussed in further detail for the mining industry in Section 2.1.3). One of the most forceful critiques of the stockholder paradigm is that it has been unable to prevent corporations from externalizing their costs onto stakeholders,
leading to environmental degradation and other impacts (Hawken, 1993). The failures of the stockholder model have been brought to the fore by the anti-globalization movement (Klein, 2000) to the extent of demanding fundamental redefinition of the corporation (Bakan, 2004). The “holy grail” of corporate social responsibility (CSR), under which public participation is often subsumed, is the “business case” that CSR is justified by its financial benefits alone, apart from any ethical arguments. Although this position is not empirically definitive (Donaldson & Preston, 1995; Svendsen, 1998), it is compelling enough for most major Canadian mining companies to publicly support it. Thus support for public participation in the mining industry and other sectors is contingent upon societal expectations and their influence on shareholder value (Humphreys, 2000).

The definition of a “legitimate” stakeholder from a corporate perspective has broadened considerably over time from only primary stakeholders (upon whom the corporation directly depends) to include more and more secondary stakeholders (who have an interest in the corporation’s activities). The sphere of interest has grown from just employees and customers (Donaldson & Preston, 1995), to encompass suppliers, local communities and even NGOs, who have had largely antagonistic relationship with the mining industry. Active involvement of the NGOs has been limited, but there are some positive examples of collaboration, including a collaborative learning program between BHP Billiton and Oxfam Community Aid Abroad (CAA), called the Corporate Community Leadership Program (CCLP). The CCLP was designed to sensitize BHP Billiton managers to a participatory and human rights-based approach to development (Kemp, 2003). Rio Tinto also has a number of collaborative projects in conservation with government and NGOs such as Birdlife International (Rio Tinto, 2003).

Today, many corporations have combined “made for business” strategies and rationales from stakeholder theory with methods and experience from the public participation field.

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8 Evan and Freeman (1993) offer an example of the ineffectiveness of this theory when it comes to negative externalities: “No one has an incentive to incur the cost of clean-up or the cost of nonpollution, since the marginal gain of one firm’s action is small. Every firm reasons this way, and the result is pollution of water and air. Since the industrial revolution, firms have sought to internalize the benefits and externalize the costs of their actions.”
Although most public participation practice and research has been in the government sector, corporations have adopted the rhetoric and methods of public participation theory for their own use.

2.1.3 Public participation in the Canadian mining industry

This section discusses the public participation policy and practice of the Canadian mining industry. It focuses only on senior companies that are either based in Canada or operate mines in Canada. The senior companies have more developed sustainability and public participation policies and have tended to lead the junior (exploration) and mid-sized companies in this area (MacDonald, 2002). They also have more resources to organize and fund public participation decision processes that are complex and important enough to justify rigorous application of decision analysis, which is the focus of this thesis. BHP Billiton, the owner of the Ekati Diamond Mine that is involved in the case study, is a senior mining company based in Australia. These companies are transnational and their policies are consistent with other seniors around the world, partly due to the emergence of international quasi-regulatory guidelines on environmental and social performance mandated by international financial institutions such as the International Finance Corporation (IFC) of the World Bank Group.

The Canadian mining industry shares many of the rationales for public participation expressed in Section 2.1, as well as having particular sectoral characteristics and concerns. The industry is stigmatized by the public, so building trust with stakeholders is a key concern. The industry uses the phrase “social license to operate” to describe the acceptance it needs in order to permit and operate mines successfully (Joyce & Thomson, 2002; Thomson, 1999).

This focus on the “social license to operate” is one of the reasons why most senior mining companies have developed sustainability and corporate social responsibility (CSR) policies with a growing emphasis on indicators and measurable results. One of industry’s responses was the initiation of the independent two-year Mining, Minerals and Sustainable Development (MMSD) project in 2000 that identified a number of key challenges for the industry, including access to information, stakeholder engagement in
governance, and local communities (IIED, 2002). This emphasis on improving relationships with stakeholders is also at the forefront of the work of the Mining Association of Canada in its Towards Sustainable Mining initiative. This has a primary objective of encouraging and facilitating dialogue between mining companies and their communities of interest.

Stakeholders of the Canadian mining industry include employees, contractors, Aboriginal peoples, citizens of mining communities, suppliers, customers, environmental organizations, governments, the financial community and shareholders (Mining Association of Canada, 2003). Since most mining activities take place in the Aboriginal traditional territories, building positive relationships with Aboriginal communities is a key priority.

Although this thesis concentrates on industry-initiated public participation, government policy has an important influence on corporate policy and practice and is also discussed in the following sections.

Policy
As noted earlier, corporate policies on sustainability and public participation are now common practice for mining companies. PricewaterhouseCoopers’ annual review of the global mining industry reviewed 30 of the largest mining companies around the world and found that 20 of the 30 published a separate sustainability report in addition to their annual report, and the majority of the remaining companies included information on their environmental and social performance in their annual report (PricewaterhouseCoopers, 2004).

The policies of following nine senior mining companies were examined in publicly available annual reports or sustainability reports: Barrick Gold (2003), BHP Billiton (2004b), Placer Dome (2003), Noranda/Falconbridge (2004), Rio Tinto (2002) and its Canadian subsidiary Diavik Diamond Mines (2004), Suncor (2004), Syncrude (2003) and
TeckCominco (2004a). Companies were selected based on size (market capitalization) for Canadian-based companies or because they have mines or projects in the same jurisdiction (i.e., the Northwest Territories) as the case study, for offshore based companies. All the companies have stated their commitments to public participation, using a diversity of names reflective of the general ambiguity over terminology: stakeholder consultation, community involvement, public participation, communities of interest, stakeholder engagement, dialogue, etc. The following examples illustrate these commitments.

BHP Billiton’s Health, Safety, Environment and Community (HSEC) Management Standard number seven on “Communication, consultation and participation” states that: “Effective communication and consultation is maintained with stakeholders associated with BHP Billiton activities, and they are encouraged to participate in and commit to HSEC performance improvement initiatives” (BHP Billiton, 2004b, p. 13).

Placer Dome’s Sustainability Charter (2003) describes its policy to “implement effective and transparent engagement, communication and independently verified reporting arrangements with our stakeholders” (p. 3) and further states:

We are committed to building partnerships with our host communities and other stakeholders, and despite divergent views, we are committed to work towards consensus. Ultimately, achieving sustainability requires the support and active participation of our stakeholders; we cannot achieve sustainability on our own.

The Mining Association of Canada (MAC), which includes all of the above companies (or their Canadian subsidiaries) among its membership, launched a Towards Sustainable Mining (TSM) initiative in 2004. This was driven by recognition that the mining industry’s past efforts to improve its public image and stakeholder relations by using a public relations approach were unsatisfactory. According to MAC, TSM represents “a strategy for improving the mining industry’s performance by aligning its actions with the

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9 Barrick Gold, BHP Billiton, DeBeers Canada, Placer Dome, Noranda/Falconbridge, Rio Tinto, Suncor, Syncrude, TeckCominco. Companies were selected based on size (market capitalization) for Canadian-based companies and having mines or projects in the same jurisdiction (i.e., the Northwest Territories) as the case study, for offshore based companies.
priorities and values of Canadians” and “a process for finding common ground with our communities of interest” (2004) based on performance.

External outreach (dialogue with mining stakeholders) is one of the components of this initiative, along with crisis communications, tailings management and energy management. Performance indicators have been developed for each of these to enable consistent reporting and benchmarking by MAC member companies. MAC has also developed an Outreach and Dialogue Field Guide to build capacity among its members to engage in dialogue with their respective communities of interest (Mining Association of Canada, 2003). A TSM Communities of Interest Advisory Panel, including representatives from labour, Aboriginal organizations and communities, NGOs, mining communities and the investment sector, meets semi-annually to foster dialogue between the industry and its communities of interest, and to help shape TSM goals.

Broad policy commitments found in corporate charters and management standards are also expressed in more specific policies at the individual mine level. BHP Billiton (2004b) states that:

Each of our sites prepares a community relations plan that helps them to identify their key stakeholders, particularly those from vulnerable or marginalized groups. These plans also detail the contact, frequencies and engagement mechanisms that are unique to each site and situation (p. 16).

Government policy encourages public participation and provides opportunities for stakeholder involvement independent of any corporate initiatives, largely through the environmental assessment (EA) and permitting processes. Table 2-3 illustrates the opportunities for public participation made available during the EA process by the Canadian Environmental Assessment Agency (CEAA).
Table 2-3 Public participation during the environmental assessment process (Canadian Environmental Assessment Agency 2005)

- Visit the Canadian Environmental Assessment Registry for information about projects taking place in your area.
- Apply for funding to assist your participation, or that of your organization of group, in the comprehensive studies, mediations and review panels through the Agency’s Participant Funding Program.
- Take advantage of opportunities to participate in screenings, including reviewing and commenting on screening reports before a final decision is made on the project.
- Examine and comment on a class screening report before the Canadian Environmental Assessment Agency declares it an appropriate means to assess similar projects.
- Review and submit comments during a comprehensive study process. The Minister of the Environment takes public comments into account before determining the future of a project.
- Participate in any public meetings or hearings associated with a review panel.

CEAA works with provincial and regional EA offices such as the Mackenzie Valley Environmental Impact Review Board (MVEIRB) in the NWT to coordinate environmental assessment of mining projects and other industrial activities. In addition to attaining an EA certificate, proponents must also acquire various licenses and permits for land and water use, among others. In the Ekati case study context this is under the mandate of the Mackenzie Valley Land and Water Board (MVLWB), whose vision for itself expresses a clear commitment to public participation: “A forum for regional decision making, ensuring effective participation of residents in the use, protection, and benefits of the lands and waters of the Mackenzie Valley” (Mackenzie Valley Land and Water Board, 2005). Opportunities for public participation are similar to those in the environmental assessment process. A study by Sinclair and Diduck (2001) found that although regulatory bodies in the EA process place considerable onus on proponents for conducting public participation programs, proponents were given little guidance in developing such programs and criteria and standards for evaluating them were not available.

Aboriginal peoples are also developing their own policies for mining on their traditional lands (Hipwell et al., 2002). For example, the Innu Nation of Labrador and eastern Quebec published “Mineral Exploration in Nitassinan: A Matter of Respect – Innu Nation Guidelines for the Mining Industry” after publicity around the Voisey’s Bay nickel
deposit discovery in 1995 resulted in 280,000 claims being staked and several dozen exploration companies descending on Nitassinan (Labrador and eastern Quebec) in the space of a few months, all without Innu consent. This document contains explicit guidelines on community consultation and information, including what information companies are required to provide and to obtain about Innu activities such as hunting and trapping, and procedures for resolving potential conflicts between such activities and mineral exploration activities (Innu Nation, 2001).

Practice
Mines interact intentionally with stakeholders in a variety of ways at different levels on the Public Participation Spectrum (Figure 2-1) throughout the mine life cycle. Some public participation programs and activities are ongoing while others are tied to specific part of the mine project life cycle. Most mines have regular information transfer activities and conduct more intensive consultation and involvement on a sporadic “as-needed” basis.

At the lower end of the spectrum (i.e., information sharing) there is rarely a clear distinction between PR and public participation activities. For instance, most mines produce a regular newsletter than provides updates on mining activities and charitable community involvement. Company assistance with community projects is often done through trusts, funds and foundations that share or delegate decision-making to communities (Harvey, 2002; Laurence, 2001). However, this form of public participation, although superior to older paternalistic models of mine-community relations in which companies made such decisions unilaterally, does not entail stakeholder involvement in decisions about core company activities such as tailings management or supply and procurement. Inviting stakeholders on mine tours to inspect facilities and reclaimed sites is another common technique for information transfer (Laurence, 2001).

Mines may produce annual reports on their environmental and socioeconomic performance and monitoring programs (BHP Billiton, 2003a). These reports may be presented in workshops or community meetings to allow stakeholders to provide feedback, elevating them to the consultation level on the Public Participation Spectrum.
Consulting with local citizens and Aboriginal groups to gather local or traditional knowledge (TK) is an increasingly prevalent practice for incorporating indigenous knowledge and values into environmental assessment and mine development (BHP Billiton, 2003a; Harvey, 2002; Keewatin Publications, 2000). This has the advantage of allowing stakeholders to provide input in a culturally appropriate format rather than trying to “squeeze” their knowledge into the typical Western worldview, but the actual extent of TK integration into mine decision-making is unclear. Social science methods such as opinion leader surveys and community needs assessment involving questionnaires, interviews and focus groups are also used (Harvey, 2002). These would typically be part of a SIA or a company-wide initiative rather than being driven by an individual mine.

Involvement and collaboration approaches are less common. Impact Benefit Agreements (IBA) between Aboriginal communities and mining companies have become a de facto regulation in the Canadian mining industry (Hipwell et al., 2002; Sosa & Keenan, 2001; Wolfe, 2001). These comprehensive agreements cover a wide range of issues outside the scope of public participation, including financial payments and employment provisions, but they may also include specific provisions for involvement of Aboriginal representatives in decision-making on mine environmental issues, access to company information and dispute resolution mechanisms such as those found in the Musselwhite General Agreement. This agreement was negotiated and signed in 1992 between Placer Dome Inc. with its joint venture partner TVX Gold Inc. and four First Nation groups and two tribal councils affected by the Musselwhite mine project (Hipwell et al., 2002). While the content of IBAs may provide only some guidance for ongoing Aboriginal participation in mine decisions, the negotiations required to reach these agreements do give Aboriginal groups greater agenda-setting influence than most other public participation activities.

Public liaison committees, particularly for stakeholder involvement around reclamation and mine closure are another forum for involvement and collaboration (Britton, 1998; Porcupine Joint Venture, 2003; Whale, Dawson, & Ridge, 2001). These committees are
formed around mandates of shared interest (e.g., community economic development, environmental protection) where the parties have different but complementary responsibilities. The Sullivan Public Liaison Committee involved TeckCominco, the owner of the Sullivan Mine, municipal and provincial governments, ENGOs and Aboriginal groups in planning for sustainable economic development in the town of Kimberly, B.C., which had built up around the mine over its 92 years in operation (Whale et al., 2001). It is worth noting that the committee did not start in earnest until a temporary mine closure reminded all of the participants of the challenging reality of mine closure for the community. Another example is the Porcupine Watchful Eye, which is a group of interested community stakeholders who meet on a regular basis to discuss sustainability issues relating to Porcupine Joint Venture mining and reclamation activities. Members of the group include representatives of the Timmins Fur Council, Amateur Naturalists, the City of Timmins and representation from the mining company. The group has undertaken a number of environmental monitoring and habitat restoration at the mine (Porcupine Joint Venture, 2003).

Britton’s (1998) evaluation of three such committees in British Columbia (including the Sullivan committee) noted that although these public participation initiatives were well-structured for promoting involvement and generally supported by participants, they were relatively weak with respect to decision-making. He further recommended future research in applying techniques of decision analysis to public participation processes to facilitate the making of informed and insightful reclamation decisions.

The highest level of the Public Participation Spectrum, empowerment and delegation of final decision-making to stakeholders, is not practiced by mining companies. Since companies bear the ultimate liability for their decisions regarding mine activities, it is unlikely a mining company (or any private corporation for that matter) would willingly forego its right to make the final decision. In general most public participation activities are on the information transfer and consultation end of the Public Participation Spectrum, and involvement and collaboration activities are sporadic and uncommon. Critics in the NGO community such as Hipwell et al. (2002) declare that the positive examples of
meaningful consultation in the mining industry, particularly with Aboriginal peoples, are still the exception rather than the rule. Putting public participation policies into practice at the operating mine level is a challenge for companies and the extent of integration into engineering practice is murky.

Government-initiated public participation, almost all of which is part of EA and permitting processes, are described in Table 2-3. These processes have advantages of clear guidelines and uniformity that does not leave all public participation in the hands of mining companies, but they represent a minimum standard and have necessarily judicial elements (e.g., public hearings) that do not foster collaborative solutions. Sinclair and Diduck (2001) cite one EA manager who said: “one concern we hear is that once the public participates and provides their input it is put into a black box” (p. 125). They also point out that consultation is not required until well on in the planning process—which questions its meaningfulness—and passive information dissemination techniques are favoured over continuous information exchange mechanisms such as community advisory committees. Public hearings have been criticized because communication is typically one-way, with little opportunity for dialogue. Further, the timing and location of hearings, as well as their highly technical nature, are “formidable” challenges for low-income and minority citizens to overcome. Often hearings are seen to contain and control participation by allowing only limited choices on narrow, short-term questions at a late stage of the policy process (Rowe & Frewer, 2000).

Complying with regulatory requirements for consultation and public participation during the EA process may not be enough to ensure the success of mining projects. In the case of the Tulsequah Chief mine project in northwestern British Columbia, the B.C. Supreme Court issued an injunction in June 2000 temporarily halting work on the project, citing the B.C. government’s failure to engage in meaningful consultation with the Taku River Tlingit First Nation during the 1998 EA process which had originally approved the project (Hipwell et al., 2002). To date, the development of the mine has not proceeded.
EA processes in the NWT have spawned some innovative third-party arrangements to facilitate public participation and ensure good environmental and social performance. A major outcome of the EA for the Ekati Diamond Mine included an Environmental Agreement that stipulated the creation of an Independent Environmental Monitoring Agency (IEMA) as a mechanism to support the achievement of the Agreement’s environmental protection goals, including providing advice to BHP Billiton and facilitating the effective participation of Aboriginal people and the general public (discussed in greater detail in Section 3.1.4) (BHP Billiton, 2004c). The Diavik project followed this path by creating a Diavik Community Advisory Board (DCAB) and an Environmental Monitoring Advisory Board (EMAB) in accordance with the socio-economic and environmental agreements reached in the EA process. DCAB provides advice to the Diavik Mine with respect to issues such as business opportunities, recruitment strategies, cross-cultural awareness and employee-specific support programs. EMAB provides similar input for environmental monitoring programs (Diavik Diamond Mines, 2004). Both of these northern diamond mines have involved Aboriginal peoples in participatory environmental monitoring related to the mines and have funded Aboriginal communities to undertake monitoring programs of their own design.

Most community and Aboriginal involvement in mining decision-making is still initiated by governments or mining companies, but these groups have been increasingly successful in acquiring funding from various sources (companies, government and NGOs) to conduct independent studies and monitoring programs that inform assessment of mine-related activities. Capacity-building is needed in most cases to facilitate full community and Aboriginal participation in technical engineering and science aspects of mine decision-making.

Structured decision processes (SDPs) have not been used in public participation in the Canadian mining industry. They have seen limited use in the USA in public participation processes initiated by regulators (discussed in more detail in Section 2.3). In Canada there have been some use of SDPs in other resource industries such as the Water Use
Planning processes undertaken by BC Hydro, a utility company in British Columbia (BC Hydro, 2005)

2.2 Criteria for evaluation of public participation

I have argued thus far that public participation is of vital and growing importance to the mining industry, and presented rationales for practicing public participation. I have also hypothesized that SPDs can provide a suitable framework for effective public participation. There is evident conceptual appeal in an explicit, transparent and quantitative framework for making decisions with stakeholder involvement; however, real-world decisions involving real people often bear little resemblance to the abstract principles of decision-making models. The essential question is: do SPDs work in practice?

This is especially important for mining companies, who are generally conservative in their use of innovative public participation because of the negative publicity they have received in the past. Regulatory (i.e., government) agencies, the other parties that may conduct such processes, have limited resources for assessment of mining projects and cannot devote the considerable time, energy and funding that such processes require without reasonable assurance that they will be fruitful. Forward looking assessment provides some information in this regard, but it is the evaluation of SDPs based on empirical data that is the best means of answering the question posed above.

2.2.1 Why evaluation is important

Evaluation is about determining merit or worth, usually by careful appraisal and study (Chess, 2000; Merriam-Webster, 2004). It is a diverse field and evaluations vary in their goals and methodology. There are three primary reasons for conducting evaluations: to judge merit or worth, to improve programs, and to generate knowledge (Patton, 1997). Judgment-oriented (summative) evaluation looks retrospectively at a participatory process for accountability and decisions regarding replication. Improvement-oriented (formative) evaluation typically occurs during a process, with the aim of making mid-course corrections and generally optimizing the process. One evaluator’s metaphor
illustrates this distinction: “When the cook tastes the soup, that’s formative; when the guests taste the soup, that’s summative” (ibid., p. 69). Knowledge-oriented evaluation expands the scope of usage from instrumental to conceptual; it seeks to increase knowledge that is generalizable beyond the process at hand. Academic research usually falls into this category.

Public participation processes are initially more complex, costly and potentially frustrating than the traditional “Decide-Announce-Defend” model of decision-making; the ostensible benefits of public participation, including better decisions, increased trust and reduced conflict, come much later than the initial investment of resources. Managers therefore have a justifiable interest in knowing that public participation is effective in attaining its goals, and yet:

there is little systematic knowledge about what works in public participation, deliberation, and the coordination of deliberation and analysis. When government agencies and other organizations have promoted or created specific deliberative processes, they have rarely reported the results of their efforts (National Research Council, 1996, p. 76).

Programs are employed ad hoc, and the lack of data on both process considerations and the quality of resultant decisions also make improving existing programs more difficult (Beierle, 2002; Chess, 2000; van Asselt Marjolein & Rijkens-Klomp, 2002). However, more and more attention is being paid to evaluating public participation

Evaluations have two foci: how public participation activities take place (process evaluation) and the results of participatory processes (outcome evaluation) (Chess, 2000; Chess & Purcell, 1999). Process evaluation examines the means used to make a decision and explores issues such as fairness, information exchange, group process, and procedures. Outcome evaluation defines success from results of public participation using goals such as consensus, education and improved quality of decisions. Some researchers concentrate on only one of these aspects, but others believe that public participation should meet some balance of outcome and process goals (Renn et al., 1995). Process

10 In DAD decision making stakeholders are informed only after a decision has been made.
considerations should not be downplayed as merely means to “getting results”; the literature on procedural justice suggests that fair processes are likely to have an equal or greater impact on the level of participant satisfaction than any substantive decisions made (Kim & Mauborgne, 1997; Lawrence, Daniels, & Stankey, 1997). If participants are satisfied, they may learn more, share more opinions, brainstorm more effectively, trust the sponsoring organization more and engage other stakeholders more constructively (Beierle, 1998). Chess and Purcell suggest that participants’ satisfaction with participatory processes may be associated with satisfaction with outcomes, although they warn that other studies found examples where processes were rated as satisfactory on process and unsatisfactory on outcome, and vice versa. In any case, there is no arguing the fact that public participation should have a goal of improving decisions, and what little evaluation of stakeholder processes has been conducted has focused on process, not decision outcomes (Beierle, 2002).

2.2.2 Selecting goals and criteria

Chess and Purcell (1999) identify two major methods for selecting goals and criteria: criteria based on participants’ goals and satisfaction and theory-based criteria. Beierle (1998) adds to this “rules of thumb” which practitioners and researchers have found to be consistently successful over time, which are likely reflective of the former two sources (Table 2-4).

Table 2-4 Practitioner “rule of thumb” criteria for public participation (Beierle 1998)

| • Clarity of goals and roles of participants; |
| • Sufficient resources, including financial support, time, and information; |
| • Recognition of the legitimacy of public input equal to that of officials and technical experts; |
| • Procedural independence of public to make decisions, set the agenda, and acquire technical information; and, |
| • Presence of a strong chairperson or facilitator |

Participant-based criteria are specific to the process at hand, and may vary depending on culture, decision problem, historical context, and other factors. These criteria provide
important information to the conveners of a participatory process as they decide whether it provides sufficient benefits to justify their continued support and funding.

However, participant-based criteria also present major challenges. Evaluating based on participant-defined outcome criteria raises the difficulty of deciding whose definition of success should be used to base the evaluation. For example, is it the mining company's desire for expedient permitting of a project, or the NIMBY residents' interest in the halting of a project? One could argue that all participants have shared interests (e.g., health and public safety), in addition to their own interests, and that these are often more fundamentally important than individual interests. Public participation could be evaluated objectively according to how well it serves the collective interest; the difficulty here is defining with certainty the collective will. Assessing the subjective satisfaction of all the participants is another option; the challenge here is choosing and justifying a weighting scheme that would permit an overall quantitative evaluation (Beierle, 1998). This would also complicate the comparison of different participatory models or techniques (Renn et al., 1995). These considerations led to the development of theoretical bases for evaluating public participation.

Criteria based on a particular theory have the advantage of being consistent for different models in varied contexts. Webler suggests that public participation should manifest the general goals of “fairness,” giving participants equal opportunities for interaction, and “competence,” which he defines as “construction of the most valid understanding and agreements possible given what is reasonably knowable at the time” (Renn et al., 1995). Webler's normative framework emphasizes multi-way communication, consensus-based interaction, critical self-reflection and “reasonableness” as traits of “right” participation that balances individual interests with collective well-being.

In contrast to Webler's focus on the communication between individuals, Fiorino (1990) takes a macro-level perspective; he draws on contemporary democratic theory in

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11 NIMBY is an abbreviation of Not In My Back Yard (i.e., someone who objects to siting something in their own neighbourhood but does not object to it being sited elsewhere).
developing the following four criteria that measure how well citizen participation mechanisms meet democratic ideals: direct participation of amateurs (non-experts), shared decision-making authority, face-to-face discussion, and basis for equality with experts or officials in interaction (e.g., agenda setting, questioning technical experts). Fiorino focuses on normative criteria because he believes that participation in environmental risk decisions reflects technocratic rather than democratic values\textsuperscript{12}; however, he also acknowledges that instrumental and substantive criteria, such as clarifying the factual basis of disputes and improved decision quality, and practical considerations of cost are of some importance.

However, even theorists acknowledge that not all public participation should aim for theoretical ideals. For example, routine decisions with little impact may not require extensive deliberation (Renn et al., 1995; Thomas, 1995). Evaluators may also have trouble reconciling the abstract and philosophical basis of these theories with the need to be make their findings practical for their intended users as emphasized in evaluation literature (Patton, 1982, 1997).

Beierle (1998) proposes an evaluative framework of “social goals” that are valued outcomes of a participatory process, but transcend the immediate interests of any party in that process. These broader social goals include: educating and informing the public, incorporating public values into decision-making, improving the substantive quality of decisions, increasing trust in institutions, reducing conflict, and achieving cost-effectiveness.

Rowe and Frewer (2000) propose criteria based on their experience that strives for applicability to a wider range of methods, including indirect techniques such as surveys. Their criteria fit the description of what Beierle refers to as practitioners’ “rules of thumb.” Rowe and Frewer do not link their criteria to a theoretical basis or participant goals, but rather divide their criteria into acceptance and process criteria.

\textsuperscript{12} Technocracy is government by technicians, more specifically the management of society by technical experts (Merriam Webster, 2004).
Chess (2000) recommends that practicing "methodological pluralism" in evaluation (i.e., mixing the use of theory-based criteria and goals defined by participants) holds the greatest promise for greater sensitivity to the differences in goals of participants and greater ability to compare between programs. Chess also suggests that studies identify the extent of differences between theoretical criteria and those based on participants' expressed goals. Beierle (1998) states that "there is no 'right' evaluative framework. The choice of approach should be tailored to the kind of problems the evaluator is interested in and the questions he or she is trying to answer" (p. 15). Methodological pluralism is consistent with the recommendation of public participation practitioners that a range of participatory methods of varying intensity and deliberation be used complementarily to engage the spectrum of stakeholders who have differing levels of interest, legitimacy and influence (Connor, 1999a; Fiorino, 1990; Thomas, 1995); different techniques entail different criteria that may adhere to a greater or lesser degree to theoretical ideals. For example, a responsive publication mailed to the general public to inform and solicit input from ambivalent citizens would rate poorly against many theoretical criteria, but may be an excellent complement to an intensive participatory process for more concerned stakeholders. Even studies of the relative effectiveness of public participation methods against a common set of criteria have not found a single best method (Chess & Purcell, 1999; Rowe & Frewer, 2000).

In summary, it is recognized that public participation needs systematic evaluation to improve its application and judge whether to implement it. Different sources of criteria have been proposed and many researchers espouse "methodological pluralism," ideally maintaining enough similarity to allow comparison of different models of public participation while maintaining flexibility to adapt to specific contexts.

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13 A responsive publication is an information brochure mailed out with a tear-off slip or return envelope that recipients can return to the proponent with comments or concerns (Connor 1999).
2.3 **A primer on decision analysis**

2.3.1 *Why mining decisions are difficult*

The mining industry is faced with difficult decisions. The process of developing a mine today requires a series of decisions based on limited information collected during the exploration phase. Hundreds of millions of dollars are invested based on expert judgment, experience and limited data from geo-physical surveys and diamond drilling core that represents a minute proportion of the mineral resource to be mined. Miners in every era have made decisions that are difficult because of the inherent uncertainty of the geology of mineral resources hidden in the ground.

The increasing complexity of mining has also made decisions more difficult. Mines have tended to become bigger, utilizing larger and more sophisticated equipment; the complexity of the mining system itself is compounded by the expansion of mining into areas that introduce situational complexity. Mining today occurs in regions with complex regulatory environments, unstable political regimes and physical environments that present major geotechnical challenges. Each of these sources of complexity adds its own inherent uncertainty.

Mining decisions today must also take into account multiple objectives. In the early 20\textsuperscript{th} century, achieving sufficient mine production to guarantee the economic success of the mine was effectively the sole objective. Spurred on by a number of disastrous mine accidents, an emphasis on miner safety evolved in the industry, adding safety objectives to the decision context. The growth of the environmental movement since the 1960s has added environmental objectives such as protection of wildlife habitat and water quality, first as expectations, then as legal requirements. Similarly, the introduction of sustainability thinking in the 1980s has added social objectives such as maximizing local employment and protecting cultural resources; these objectives are not codified as much as environmental ones but are sure to follow the same pattern. Sustainability also emphasizes the interconnectedness of social objectives with economic and environmental ones and stresses holistic problem solving. The result of all these changes is that mining
decisions must accomplish multiple objectives, inevitably requiring trade-offs between objectives.

Society expects mining decision-makers to take all of the above into consideration, but mining companies are not, nor should they be, primary providers of social services or experts in every aspect of the biophysical and socio-cultural environment in which they operate. Making good decisions therefore often requires information and involvement from stakeholders who have expertise and responsibilities in such areas. Many stakeholders are demanding greater influence on decisions that affect them, reflecting a societal emphasis on public participation in decision-making that has roots in sustainability concepts. A significant challenge of involving multiple stakeholders in decision-making is that different perspectives lead to different conclusions. In other words, stakeholders may interpret the same information and reach very different conclusions based on their distinct values. This variation in perspective is also evident within mines; different components of the organization such as production units and environmental and mine planning departments embody different disciplinary traditions and have different directives that make finding internal consensus on decisions a challenging prerequisite to involving external communities of interest.

Some in the mining industry would argue that it is unrealistic and undesirable to achieve so many social and environmental objectives, and to proactively involve stakeholders. Ignoring the pressures of public opinion forces stakeholders to find alternative means of influencing mining decisions such as lawsuits, protests and media campaigns; there is growing evidence that these actions can severely constrain mining companies, to the extent of killing otherwise viable projects. Therefore, the difficulty of mining decisions is inescapable, but mining decision makers have the choice of engaging those sources of difficulty proactively and creatively, or having constraints imposed on their decision-making by taking a reactive stance. The first option is clearly more appealing, but what resources are available to assist decision makers with making good decisions subject to inherent uncertainty, complexity, multiple objectives and differing perspectives (Clemen
My hypothesis is that decision analysis can provide these necessary resources.

### 2.3.2 Overview of decision analysis

There is no trivial solution to getting good outcomes from difficult decision problems; even well thought decisions are subject to some element of chance. However, having a well-developed understanding of a decision problem can greatly increase the likelihood of enjoying a better outcome. Decision analysis prescribes a structured approach to decision-making that can foster the necessary understanding. In practice, decision analysis is often boiled down to a quantitative framework for analysing and comparing alternatives associated with complex decision problems (Ohlson, 1999). A range of quantitative and qualitative analytical tools supports this framework.

Decision analysis developed from roots in mathematics and economics, particularly in the study of subjective probability and utility theory (Howard, 1988; Keeney, 1982). These roots shaped the structured approach that provides the framework “skeleton” for quantitative comparison of alternatives. Decision analysis has also been shaped by insights from psychology on the behavioural aspects of decision-making (Keeney, 1982; von Winterfeldt & Edwards, 1986). Consideration of qualitative values and judgments fleshes out the evaluative framework. The synthesis of these two disciplinary traditions has produced a systematic, quantitative model for decision-making that integrates qualitative judgment in an explicit and defensible manner.

Decision analysis theory was initially developed for the case of a single decision maker, but adapted in response to the interaction of multiple decision makers and stakeholders present in many real-world decision problems. The multiple-stakeholder approach, in which the same decision problem is analyzed from the perspective of different stakeholders, was the result; the goal of this approach is not to find the best alternative, but to “clarify the values and opinions of the stakeholders, to pinpoint the sources of disagreement, and to develop compromise solutions” (von Winterfeldt, 1992, p. 322).
This introduced elements of negotiation and collaboration and as a result, crosses over into the realm of public participation.

In summary, decision analysis is based on principles that prescribe a process for decision-making. Analytical tools have been developed to assist with various steps of the process. Each of these - process, principles, and tools - is discussed in the following sections. These are applicable both to traditional (single decision maker) and multi-stakeholder decision analysis. Since the latter is most germane for this thesis, attention has been drawn to aspects that are particularly important for a multi-stakeholder context.

**Terminology of decision analysis**

Decision analysts assign precise meaning to a number of terms that may be used or understood differently in common usage. Definitions of the key decision analysis terms are given below.

*Values* are what we consider as intrinsically desirable or valuable. In decision analysis, values are more precisely defined as "principles for evaluating the desirability of any possible alternatives or consequences (Keeney, 1994, p. 33)." They define all that decision makers care about in a specific decision and are the most fundamental aspects of any decision.

An *objective* is a statement of something that one wants to strive towards or achieve. It is characterized by a decision context, an object and a direction of preference. For example, a mine would have an objective to “minimize water quality impacts” from their tailings facility. The decision context is tailings management, the object is water quality and the direction of preference is less impact rather than more. Objectives are further distinguished as *fundamental objectives*, which concern the final outcomes the decision makers value in a specific decision context, or *means objectives*, which are ways of achieving ends (Keeney, 1994).

*Attributes* (also called attribute scales) measure the degree to which objectives are achieved. Objectives may have natural, proxy or constructed attribute scales (Clemen &
Reilly, 2001). Some objectives such as “minimize construction costs” can be measured quantitatively with a natural attribute scale like dollars. Others may have a suitable proxy attribute that measures an indicator with a known or inferred relationship to the actual objective in cases where the objective is very difficult or impossible to measure (e.g., measuring greenhouse gas emissions as a proxy for measuring effects of industry on climate change). Custom attribute scales can be constructed for objectives related to values such as aesthetics or cultural resources that may not have a natural or proxy attribute (constructed scales are further described in Section 2.3.5).

Alternatives represent the range of potential choices a decision maker has for pursuing his or her objectives. Consequences (also called impacts) are the expected outcomes with respect to each of the attributes for the alternatives under consideration. The decision maker articulates his preference for consequences in terms of tradeoffs between objectives. Tradeoffs involve giving up something in one objective in order to achieve more in terms of another (Hammond, Keeney, & Raiffa, 1999).

Decision analysis applications are known by a number of similar terms, including multi-attribute tradeoff analysis, multi criteria decision-making, multi criteria analysis, multiple accounts analysis and other variants. These terms are not clearly differentiated and may describe a decision by a single decision maker or a multi-stakeholder decision process. For the purposes of this thesis, multi-stakeholder applications of decision analysis are referred to generically as Structured Decision Processes (SDP).

2.3.3 Process

Decision analysis is founded on a set of axioms that imply that the attractiveness of alternatives in a decision problem should be based on i) the likelihoods of the possible consequences of the alternatives; and ii) the preferences of decision makers for those consequences (Keeney, 1982). These axioms provide the theoretical basis for the decomposition approach at the heart of decision analysis:

\[14\] An axiom is “a statement accepted as true as the basis for argument or inference” (Merriam-Webster 2004).
The methodology of decision analysis consists of decomposing a decision problem into its factual and value parts, analyzing the factual parts as probability problems, analyzing the value parts as utility problems, and re-aggregating both by using explicitly stated and logical principles of probability and utility theory (von Winterfeldt, 1992, p. 321).

The application of this methodology is illustrated in a four-stage process suggested by Keeney (1982) and shown in Figure 2-4 and summarized in Table 2-5. The terminology for the specific SDP used in the case study, Multiple Accounts Analysis (MAA), is also shown.

Figure 2-4 The generic decision analysis process (Keeney, 1982; Ohlson, 1999)
### Table 2-5 The generic decision analysis process

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Define and structure the decision problem</td>
<td>Specify the decision to be made. Define and structure the objectives of the decision-makers.(^{15}) Using these objectives, develop specific criteria to evaluate alternatives. Define current alternatives and generate new alternatives.</td>
</tr>
<tr>
<td>2. Assess the impacts</td>
<td>Specify the probable impact of each alternative with respect to the objectives defined in Step 1. Impacts are assessed and quantified using empirical data, modeling and subjective judgment from a variety of sources. Special emphasis is placed on modeling uncertainty in the predicted impacts.</td>
</tr>
<tr>
<td>3. Assess the preferences</td>
<td>Elicit the preferences of the decision makers for each of the impacts predicted for the alternatives in Step 2. Decision makers are required to make explicit value tradeoffs between objectives, which are quantified relative to one another to create a comprehensive utility model.</td>
</tr>
<tr>
<td>4. Evaluate and compare alternatives</td>
<td>Combine the impact model and utility model to evaluate and compare alternatives. Sensitivity analyses can be conducted on both the factual (impact) and value (utility) components of the decision problem. Iteration is used to incorporate improvements in understanding.</td>
</tr>
</tbody>
</table>

Although Figure 2-4 gives the impression of a linear process, decision analysis is ideally (and typically) iterative (Clemen & Reilly, 2001). There should be feedback loops at every stage as one gains a deeper understanding of the circumstances and events (Raiffa, 2002). Sensitivity analysis may reveal the need for more analysis or deliberation on highly sensitive aspects of a decision, or new alternatives may bring to light hidden objectives, for example. In some cases, the definition of the problem itself may need to be modified.

#### 2.3.4 Principles

Decision analysis is a prescriptive approach to improving how we make real-life decisions. Its principles are influenced both by its roots in mathematics and economics, which suggest how decisions should be made by ultra-smart, ultra-rational individuals, and also by a descriptive perspective, which describes how people actually behave in reality. Behavioural decision research has shown that people do not act in accordance

\(^{15}\) For the purposes of this section, stakeholders involved in a SDP are considered to form part of the group of decision makers, although they may not directly influence the final decision.
with normative rational ideals; they fall into a number of decision traps, also called heuristics and biases (Raiffa, 2002; Slovic, Fischhoff, & Lichtenstein, 1979). These are essentially "rules of thumb" for inferring judgments from available information that can be misleading for complex decisions. The principles of decision analysis are designed to mitigate the effect of decision traps by breaking complex decision problems into simpler sub-problems.

**Value-focused thinking**

The typical way we approach decisions problems is reactive. Decisions are thrust upon us by circumstances or by the actions of others and we regard them as problems. We face these decisions by identifying alternatives and only then consider objectives and criteria to evaluate them. Keeney (1992) describes this approach as "alternative-focused thinking" and proposes "value-focused thinking" as a proactive approach to better decision making. Value-focused thinking reverses the traditional process by identifying what is important to decision makers in a specific decision situation prior to defining alternatives:

> It is these values that are fundamentally important in any decision situation, more fundamental than alternatives, and they should be the driving force for our decision making. Alternatives are relevant only because they are means to achieve values (Keeney, 1994, p. 33).

Values are the basic principles that guide actions and preferences; they are the basis for identifying the objectives we hope to achieve in a decision situation.¹⁶ A corollary of this approach is that having a clear understanding of our values enables us to move from reacting to decisions as problems imposed upon us to proactively identifying decision opportunities (i.e., circumstances that enable us to accomplish our objectives).

**Problem structuring and decomposition**

Problem structuring is a key principle of decision analysis because it is a prerequisite to decomposing the decision problem into manageable sub-problems. Objectives are clarified and systematically related to one another. Fundamental objectives are

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¹⁶ Value-focused thinking is notably consistent with the principles of interest-based negotiation described in *Getting to Yes* (Fisher, Ury, & Patton, 1991), a well-known book on principled negotiation. Negotiation literature uses the term "interest" synonymously with "objective."
distinguished from means objectives and linked hierarchically to sub-objectives. Only fundamental objectives should be used to evaluate and compare alternatives (Hammond et al., 1999), because this allows greater creativity in finding ways to accomplish objectives. Sub-objectives that are specific enough to be measurable are used as criteria (also known as attributes) for alternative evaluation.

Defining alternatives requires creativity to expand options beyond the first alternatives that come to mind, such as the status quo, that unnecessarily constrain thinking. Focusing on values removes the “anchor of the obvious.” Alternatives are characterized with respect to each attribute (criteria) in the objective hierarchy.

Decomposition of complex decision problems happens in two distinct ways. The first is the separation of the factual and value components of the decision\(^17\) (as stated by von Winterfeldt, 1992) and the second is the decomposition of the alternatives with respect to each attribute. Within the factual component (Step 2 in the generic process illustrated in Figure 2-4), the impact of an alternative on each attribute is modeled and quantified using tools such as computer simulation or elicited judgments. Attacking one sub-problem at a time is conceptually easier for decision makers and takes into account the limitations of assessment tools.

The distinction between predicting impacts and assessing preferences allows decision makers (particularly in multi-stakeholder contexts) to reach agreement on the factual basis of predictions prior to moving on to the typically more contentious relative valuation of impacts. Pinpointing sources of disagreement can make decision processes more efficient; disagreements over data collection and modeling may be solved with more complete information or more sophisticated modeling, but if values underlie the disagreement, then negotiation, not more data, is required.

\(^{17}\) Ohlson (1999) acknowledges that the distinction between facts and values is in reality not clear-cut, but nevertheless argues for the utility of this construct: “This separation of facts and values is, admittedly, an oversimplification. Especially in the presence of uncertainty, the interpretation of scientific information is dependent on values and preferences. Thus, there is no absolute distinction between facts and values. Nonetheless, this simplification is useful in that there is a role for scientific experts in informing decision making processes that is qualitatively different from the role of affected stakeholders in assigning preferences to alternative outcomes or objectives.”
Explicit treatment of uncertainty and subjective judgment
Uncertainty over facts (What will happen?) and values (What matters?) pervades all complex decisions. Explicit characterization of the source and range of uncertainties is a fundamental principle of decision analysis. It enables decision makers to evaluate alternatives against their risk tolerance, improves understanding of conflicting expert opinions and facilitates adaptive management. Adaptive management is a systematic approach to improving environmental management that "explicitly recognizes the existence of uncertainty, documents hypotheses about the response of ecological systems to management intervention, monitors actual responses, and adjusts management actions over time" (Failing, Horn, & Higgins, 2004, p. 1).

Subjective judgments play a central role in decision analysis. Objective, value-free analysis is not possible or practical. As complexity increases, professional judgment and experience play a larger role as the percentage of a problem that can be captured by "objective data" typically decreases (Keeney, 1982; Ohlson, 1999). Vick (2002) argues that judgment is also an inherent and essential part of engineering practice, despite the common view that judgment is "stop-gap" for objective, quantitative data. Rather than downplaying the important contribution of judgment, as many decision processes do, decision analysis provides theory and procedures for systematically gathering and integrating explicit professional and value judgments. Techniques for this are well developed and described in the literature (Clemen & Reilly, 2001).

Applying value focused thinking, problem structuring and explicit treatment of uncertainty and subjective judgment contributes to a transparent decision framework, which makes decision making less arbitrary and easier to communicate (Ohlson, 1999). This transparency facilitates iteration because it is easy for decision makers to see how specific data or judgments fit into the decision framework, so new and improved knowledge can easily be incorporated.
2.3.5 Tools

The practical application of decision analysis principles is supported by a number of tools or techniques that are used to structure the decision, characterize uncertainty and assess impacts and value tradeoffs (Table 2-6). These tools complement typical tools for collecting and analyzing information such as Geographical Information Systems (GIS), environmental baseline studies and computer modeling. A number of the tools for problem framing (structuring) employ graphical representations or tables to show the often-complex relationships between problem elements. The discussion below is not intended to cover the “how to” application of these representative tools, but rather to introduce them.

Table 2-6 Summary of decision analysis tools

<table>
<thead>
<tr>
<th>Decision structuring</th>
<th>Characterizing uncertainty</th>
<th>Assessing impacts and tradeoffs</th>
</tr>
</thead>
</table>
| - Fundamental objectives hierarchy  
  - Means-ends objective network  
  - Influence diagram  
  - Decision tree  
  - Strategy table  
  - Multi-attribute evaluation frameworks | - Sensitivity analysis  
  - Expected value calculation  
  - Expected value of information methods  
  - Probability elicitation | - Constructed attribute scales  
  - Preference assessment techniques |

A fundamental objectives hierarchy or value tree expresses all the important objectives relating to a decision and defines them in terms of more specific, lower level sub-objectives (Keeney, 1992). Performance measures are developed for each of the lowest-level objectives in the hierarchy. Objectives hierarchies should strike a balance between completeness and avoiding redundancy. Only fundamental (ends) objectives are included to avoid double-counting caused by using means objectives.

A means-ends objective network shows how means objectives contribute to one another, and ultimately to achieving the overall fundamental objectives. Means objectives, unlike fundamental objectives, may be connected to several different objectives. Objectives
networks are a good basis for generating creative new alternatives (Clemen & Reilly, 2001).

An influence diagram is a simple, graphical representation of a decision situation (Clemen & Reilly, 2001). It uses differently shaped nodes to represent decisions, uncertain events and resultant outcomes, and arrows to show how elements influence one another. Influence diagrams can aid for communication of complex decisions and foster “systems thinking,” especially for SDP participants with limited technical knowledge (Howard, 1988).

A decision tree is an alternative format for decision modeling that is more detailed and amenable to calculation. It includes the same elements as an influence diagram but in a branched tree format that allows decision makers to model and see the possible future outcomes of their decisions when combined with important uncertain events.

A strategy table is a tool for organizing a series of smaller decisions in specific areas, each with a number of alternatives that make up a larger decision. A strategy-generation table displays these sub-decisions and their associated alternatives to enable the decision maker to develop a “strategy” of compatible or synergistic choices without being overwhelmed by the sheer number of possible combinations (Howard, 1988).

Multi-attribute evaluation frameworks are used to structure and concisely display the essential elements of a decision situation. It consists of a matrix with objectives along one axis and alternatives along the other, with the predicted impacts of each alternative on each objective filling the cells (also called an objectives by alternatives table or consequence table). It used to make comparisons and clarify tradeoffs between objectives.

Uncertainty is dealt with by methods varying in analytical sophistication and information requirements, depending on both the nature and the magnitude of the uncertainty itself, the potential consequences of being wrong, and the resources available. Methods vary
from simple identification of major uncertainties to simulations with continuous probability distributions for key input variables (McDaniels, 1996). Several particularly useful methods are described below:

Sensitivity analysis involves varying uncertain parameters within a plausible range to determine their effect on possible outcomes (Clemen & Reilly, 2001). This highlights what parameters are most important to the decision, and consequently where information gathering efforts (i.e., to reduce uncertainty) would be most beneficial.

Probabilistic tools are important for describing uncertainty quantitatively. Selecting an alternative on the basis of maximizing expected value (typically monetary) is one example of this approach. The expected value of an alternative is the probability-weighted average of all possible outcomes; it can be thought of as the “best guess” for the value of an uncertain quantity (Clemen & Reilly, 2001). In practice, expected value techniques require that decision makers identify all possible uncertain events, assign a probability to each, estimate the outcome of interest, and calculate the probability-weighted average (Ohlson, 1999).

Expected value of information methods build on basic expected value calculations to estimate the value that a decision maker would gain from having improved information that eliminates or reduces uncertainty. This is helpful for determining what level of resources could be reasonably committed to obtaining better information.
Probability elicitation

In many decision situations there is a lack of data on the probability of important uncertain events or conditions. Gathering this data may be too costly or time-consuming to be practical for informing a decision. Getting estimates of probabilities from structured interviews with experts in the field of interest is another option. Eliciting expert judgments is no substitute for modeling, experimentation, and data analysis, but is meant to “provide a snapshot of the state of knowledge” based on these traditional means of garnering insights for decision-making (von Winterfeldt, 1992, p. 333).

Constructed attribute scales

Quantitative valuation can be obtained for an objective that is inherently qualitative (e.g., minimize aesthetic impacts) or incompatible with existing natural measures by constructing an attribute scale that indexes a quantitative scale to written descriptions of “best” to “worst” achievement of the objective (Clemen & Reilly, 2001). There are many constructed attributes in common usage, such as gross national product (GNP) in economics and the Apgar test for assessing the well-being of newborn babies in health care. For multi-stakeholder decisions, stakeholders can be directly involved in defining the scale for objectives that most concern them.

Preference assessment techniques

Assessing the preferences of decision-makers for the predicted outcomes of decision alternatives is essential to support making tradeoffs between objectives. A number of techniques are used to assess preferences, varying from relatively simple holistic ranking to more complex, quantitative methods such as swing-weighting that elicit ratios of utility between attributes. Multiple methods may be used in the same decision problem to verify preferences; inconsistencies between methods (for each stakeholder) and between stakeholders can be used to clarify rationales behind preferences (Hobbs & Horn, 1997).

Structured Decision Processes

Structured Decision Processes (SDPs) follow the decision analysis process shown in Table 2-5 to aid multi-stakeholder decision making. Different SDPs vary in how closely they observe the full range of decision analysis principles and in which tools they employ
throughout the process. All SDPs follow the principles of decomposition and problem structuring, although they vary in the emphasis they place on distinguishing fundamental (ends) objectives from means objectives. A number of SDPs do not explicitly use a “value-focused” approach but are instead “alternative-focused” by default. SDPs may utilize sophisticated techniques (e.g., for characterizing uncertainty) or rely primarily on unstructured subjective judgment, depending on the scope, importance and availability of resources for the decision context. Multi-attribute evaluation frameworks are the primary means of organizing and aggregating relevant information for a decision; simply stated, the key differences between the various SDPs are in how this information is gathered.

Multiple Accounts Analysis
Multiple Accounts Analysis (MAA) is a simplified SDP adapted for mining applications by Robertson and Shaw (1998), mining consultants based in Vancouver.\(^{18}\) It is worth noting here that MAA uses different terminology than the standard decision analysis terms described in Section 2.3.2. The differences are shown in Figure 2-4 and summarized in Table 2-7 below.

<table>
<thead>
<tr>
<th>Standard decision analysis</th>
<th>Multiple Accounts Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective</td>
<td>Account</td>
</tr>
<tr>
<td>Attribute</td>
<td>Indicator</td>
</tr>
<tr>
<td>Alternative</td>
<td>Option</td>
</tr>
<tr>
<td>Assessing consequences</td>
<td>Scaling impacts</td>
</tr>
<tr>
<td>Assessing preferences and tradeoffs</td>
<td>Weighting accounts</td>
</tr>
<tr>
<td>Objectives by alternatives/consequence table</td>
<td>Multiple Accounts ledger</td>
</tr>
</tbody>
</table>

MAA uses a multi-attribute evaluation framework called a MAA Ledger of Accounts that divides the decision criteria into four main *accounts*: environmental, technical, project economics and socio-economics (the MAA ledger developed in the Ekati case study is shown in Appendix F). The technical account includes engineering criteria such as stability, ease of construction and maintenance requirements. The project economics

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\(^{18}\) Further description of Multiple Accounts Analysis is available at: http://technology.infomine.com/enviromine/Issues/cls_MAA.html
account includes the proponent's financial costs and benefits related to the project, while
the socio-economics account covers a broad range of external criteria including areas as
diverse as employment and aesthetics. The four accounts are then divided into sub-
accounts that are elicited from the MAA participants and given appropriate indicators to
measure their performance. In practice, the MAA ledger is developed interactively with a
spreadsheet projected onto a large screen visible to all the process participants.

A simple example of the environmental sub-account for a hypothetical decision is shown
in Figure 2-5. The sub-accounts are the criteria or issues of importance against which the
alternatives are compared (e.g., dust, contamination of surface water). Each sub-account
has one or more indicators that are measures or descriptors of the degree to which a sub-
account objective is achieved. Indicators may be natural measures such as dollar value for
costs, or may a qualitative descriptor such as "ease of construction". It is at this stage in
the MAA process that an initial set of options is developed.

Once all of the sub-accounts (on the vertical axis) and options (on the horizontal axis)
have been added of the MAA ledger, the next step is to scale the impacts of each option
on each sub-account. This step involves a synthesis of "hard" scientific data and the
judgment of those with expertise or experience in the subject matter. Both qualitative and
quantitative indicators are converted to a scalar 1 to 9 scale; this impact scale is relative,
meaning that the best option for a particular sub-account scores a 9 and the other options
are scaled relative that option, regardless of whether the best option is ideal in an absolute
sense.

The accounts, sub-accounts and indicators are then weighted relative to one another,
usually on a scale of 1 to 5, based on discussion and debate amongst the full group of
stakeholders. Weighting is done using holistic ranking and does not involve direct
valuation of tradeoffs between sub-accounts. The factual (i.e., scaling) and value (i.e.,
weighting) components of the decision are aggregated by take the sum of the scalar
values multiplied by the weights, then dividing by the sum of the weights, as shown in
Figure 2-5. This is done successively for sub-accounts, accounts and then the option as a
whole to give a summary MAA score for each option (on a 1 to 9 scale). The options are ranked in order of decreasing MAA score.

Figure 2-5 Example of environmental account of MAA Ledger

Screening out indicators that do not discriminate between options further refines the decision model. If the difference in the product of the scalar value and weight between the best and worst option is less than a threshold percentage (usually 30%), the indicator is taken out of the model by reducing its weighting to zero. This gives a greater contrast between options, because non-discriminating indicators have a “diluting” effect on the spread of the MAA scores.

Sensitivity analysis is performed to determine whether varying decision model parameters (usually weightings) change the ranking of the options. For example, one iteration is usually done with a zero weighting assigned to the project economics account to allow stakeholders to assess how important cost considerations are to the decision.
2.3.6 Experiences of implementation in the mining industry

Decision analysis has been used successfully to assist decision makers for the past 40 years (von Winterfeldt & Edwards, 1986). Early applications were in private industry and government and included new product decisions, medical problems, energy policy, and the setting of standards (Keeney, 1982). These applications involved a single decision maker and were not complicated by multi-stakeholder considerations. Mining-related applications include monitoring water flow in fractured rocks (Jardine, 1996), mining investment decisions (Walls & Clyman, 1998) and tailings facility siting (Kerr, Horne, Brown, & Poling, 2004). Use of decision analysis in the mining industry is not commonplace, but its cousin risk analysis has become standard. Risk analysis techniques such as Failure Modes and Effects Analysis (FMEA) have become a regular part of the engineering design process for mine facilities, particularly tailings dams (Vick, 2002). FMEA involves systematically characterizing the likelihood and consequences of the potential failure modes of structures, equipment or processes.

The past few decades have seen an expansion of multi-stakeholder applications as public participation in decision-making has become more prevalent. Most of these applications have been at a policy level, with many addressing natural resource management issues. This is likely due to the greater resources and time available to develop a SDP, as compared to project level decisions. BC Hydro has undertaken some of the most sophisticated and lengthy SDPs in Canada to develop Water Use Plans with its stakeholders for 23 hydro generating facilities over the past several years (BC Hydro, 2005; Gregory & Failing, 2002; Nikolic, 2002). The Association of Professional Engineers and Geoscientists of British Columbia (APEGBC) awarded BC Hydro with its Sustainability Award in 2004 for its Water Use Planning efforts (Mathews, 2004). BC Hydro’s innovative use of SDPs is facilitated by their status as a crown corporation, which gives them a stronger rationale for public participation than strictly private sector corporations. There have only been two project-level SDPs in the mining industry, all of which were initiated by regulators in the USA prior to the Ekati case study.
These two case studies have involved the use of Multiple Accounts Analysis (MAA). MAA has been closely integrated with FMEA in the design and development of operating plans (Robertson & Shaw, 2005).

The first MAA case study in 2000 was used to select a reclamation alternative for the Zortman and Landusky gold mines in Montana. These two mines were closed when the owner became insolvent, leaving the regulators with limited reclamation bonding for reclamation and closure measures. The regulators initiated the MAA with a stakeholder group consisting of three regulatory agencies (Montana Department of Environmental Quality, U.S. Bureau of Land Management and the U.S. Environmental Protection Agency), the Fort Belknap Indian Band and their technical consultants (Center for Science in Public Participation), the engineering firm selected to perform the reclamation work (Spectrum Engineering) and their sub consultants, including Robertson GeoConsultants who facilitated the MAA process. The participants met once a month for approximately a year before unanimously choosing a preferred alternative, and regarded the MAA as a success (Shaw, Robertson, Maehl, Kuipers, & Haight, 2001).

The second case study again was similar to the first, involving many of the same groups involved in the Zortman-Landusky MAA in the selection of a reclamation alternative for another mine in Montana. The Golden Sunlight MAA was conducted for an operating mine and ran from May to September 2003. The political driver for this MAA was a lawsuit by several environmental NGOs demanding that the open pit be fully backfilled, an option that the mining company claimed would render a planned pit expansion unfeasible, effectively reducing the life of the mine by five years (BLM, 2004; RGC, 2003). The participants reached a consensus on a reclamation plan but no detailed information on their level of satisfaction with the outcome is available.
Chapter 3 Case Study: Ekati Diamond Mine Tailings Management Multiple Accounts Analysis

In this section the case study at the Ekati Diamond Mine is introduced. An overview of the biophysical, socioeconomic and regulatory context of the mine is presented. The decision context of developing an updated tailings management plan for the Long Lake Containment Facility is described. The stakeholders involved in the consultation process and the Multiple Accounts Analysis approach used to structure their involvement are also presented. The evaluation of this process is discussed in Chapters 4 and 5.

3.1 Mine context

3.1.1 Location and facilities

The Ekati Diamond mine, operated by BHP Billiton Diamonds Inc., began production in 1998 as Canada's first diamond mine. The mine is located in a remote Arctic tundra region of the Northwest Territories (NWT) approximately 300 km northeast of its capital city of Yellowknife (Figure 3-1).

The diamonds are hosted in a series of kimberlite pipes that are mined with both open pit and underground methods. The mine is estimated to yield 3 to 5 million carats annually. In the process plant, diamonds are separated from the waste rock using physical processes: crushing, scrubbing and screening; heavy medium separation using a slurry of water and ferrosilicon; and X-ray recovery. Unlike mineral processing of metal ores, diamond processing does not rely heavily on chemical reagents, although a small amount of chemical flocculants and coagulants are added to the tailings stream after diamond recovery to speed the settling of fine particles and reduce the Total Suspended Solids (TSS) in the tailings water. Mining is planned to continue until 2014.

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19BHP Billiton Diamonds is part of the BHP Billiton Group, the world's largest diversified resources company with mining, oil and gas properties (BHP Billiton, 2003b).
Figure 3-1 Ekati Diamond Mine location (courtesy of Ekati Diamond Mine)
Access to the mine site is by air and winter road from Yellowknife over frozen lakes and tundra (open for about 10 weeks of the year). Ekati is operated as a long distance commuting operation, with most employees working on a two-week rotation.

3.1.2 **Biophysical environment**

The Ekati Diamond mine is located in the “barrenlands,” close to Lac de Gras in an area of continuous permafrost, 100 km north of the tree line. The mineral claim block covers 344,000 hectares or 3,440 square kilometres, of which only 10,960 hectares are included in the active mining land lease. The barrenlands are flat and covered with numerous small lakes, some of which were drained to allow mining of the underlying kimberlite pipes. The mining lease area provides habitat for a number of large and small mammals, birds and fish species, most notably the Bathurst caribou herd that migrates through the area each spring and fall.

The range of environmental issues associated with the mine include wildlife impacts, aquatic effects, impacts associated with mine waste and cumulative effects (Independent Environmental Monitoring Agency, 2001; Independent Environmental Monitoring Agency, 2002). MacLachlan et al (1996) observed in the *Report of the Environmental Assessment Panel* “potential effects on wildlife, in particular caribou, and water were the most important environmental issues in this review” (as cited by Ross, 2004, p. 182). The Bathurst caribou herd is the largest herd in Canada and caribou are of great importance for the local Aboriginal peoples.

Ekati’s management of environmental issues is centred on environmental management plans and an adaptive management strategy. The mine is ISO 14001 certified and management plans include monitoring programs for air quality, aquatic effects, wildlife effects and reclamation programs (BHP Billiton, 2003a). These plans also incorporate traditional knowledge of the Aboriginal people of the area, as required by the Environmental Assessment Review Panel (EARP), particularly in the protection of cultural heritage resources and wildlife monitoring. Adaptive management involves conducting studies and monitoring results to reduce uncertainty about environmental
effects and using this knowledge to develop mitigative strategies as impacts become known.

The Independent Environmental Monitoring Agency (IEMA) reports that "BHP Billiton has conducted its Ekati operation in an environmentally safe and responsible manner since it was first licensed. No significant environmental problems have occurred, and no major environmental issues are looming" (IEMA, 2004b, p. 2), although it also has suggestions for improvement in specific aspects of environmental management at the mine.

3.1.3 Socio-economic environment

Diamond mining is an important contributor to the NWT economy, accounting for just over 20% of the Northwest Territories' GDP in 2002 (Santarossa, 2004). This contribution is growing with newer mines such as the Diavik mine, which began producing in 2003, and a number of advanced projects scheduled to begin mining in the next few years. It is anticipated that once NWT mines reach full production, they will produce from 12% to 15% of the world's diamonds by value — making Canada the third-largest producer of diamonds, ahead of South Africa (GNWT, 2005).

Ekati has approximately 750 employees. Hiring preference is given to Aboriginal northerners and other NWT residents. In 2002 the total operations employment was 28% northern Aboriginal and 58% northerners, just below the targets of 31% and 62%, respectively, set in the Socio-Economic Agreement (SEA) signed in 1996 by BHPB and the Government of the NWT (GNWT). The SEA outlines areas of cooperation between the two parties on socio-economic factors of the Ekati Diamond Mine, including mine procurement spending, skills training and business opportunities, in addition to employment targets (GNWT, 1996). One of the stipulations of the agreement is for Ekati to reserve a portion of the rough diamonds (currently 10%) for cutting and polishing in Yellowknife as part of a strategy to develop a local diamond cutting industry. Although results are reported annually, the SEA has no enforcement mechanisms.
Ekati also entered into four voluntary Impact and Benefits Agreements (IBA) directly with Aboriginal communities of interest (Table 3-1): Dogrib Treaty 11 Council, Akaitcho Treaty 8, North Slave Metis Alliance, and Kitikmeot Inuit Association. The IBAs are confidential contracts that detail the benefits that specific Aboriginal communities receive and generally include cash payments, scholarships, as well as hiring and business preference provisions (BHP Billiton, 2003b). Employees from the point-of-hire communities (most of the communities shown in Table 3-1) are flown directly from the mine site to their respective home communities, without a stopover in Yellowknife, to ensure that increased income does not result in undue social disruption.

Table 3-1 Aboriginal communities of interest

<table>
<thead>
<tr>
<th>Affiliation</th>
<th>Community</th>
<th>Population</th>
<th>Distance from project (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treaty 11 Dogrib Dene</td>
<td>Rae-Edzo</td>
<td>1,600</td>
<td>330</td>
</tr>
<tr>
<td></td>
<td>Wha Ti</td>
<td>415</td>
<td>370</td>
</tr>
<tr>
<td></td>
<td>Rae Lakes</td>
<td>255</td>
<td>310</td>
</tr>
<tr>
<td></td>
<td>Snare Lake (Wekweti)</td>
<td>135</td>
<td>180</td>
</tr>
<tr>
<td>Akaitcho Treaty 8 Dene</td>
<td>Lutsel k’e</td>
<td>300</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>Dettah</td>
<td>190</td>
<td>310</td>
</tr>
<tr>
<td></td>
<td>N’dilo</td>
<td>150</td>
<td>310</td>
</tr>
<tr>
<td>North Slave Metis Alliance</td>
<td>Yellowknife</td>
<td>1,200</td>
<td>310</td>
</tr>
<tr>
<td></td>
<td>Rae-Edzo</td>
<td>50</td>
<td>330</td>
</tr>
<tr>
<td>Kitikmeot Inuit Association</td>
<td>Kugluktuk (Coppermine)</td>
<td>1,200</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>Umingmaktok</td>
<td>50</td>
<td>350</td>
</tr>
</tbody>
</table>

3.1.4 Regulatory environment

Mining has played a significant role in the development of the NWT, from the growth of the city of Yellowknife around the Giant and Con gold mines to the nascent Canadian diamond mining industry. However, many mines that spurred economic activity in the north such as the Colomac, Giant and Port Radium mines also left poor environmental and social legacies (NOAMI, 2003). This legacy of poorly planned mine closures has understandably spurred public vigilance of the industry, resulting in a strict regulatory environment for current mines.
The regulatory approval process for the Ekati Diamond Mine included a full panel review, the highest level of assessment under the Canadian environmental impact assessment process. The extensive review was carried out from 1994 to 1996 (Couch, 2002). Approval also required granting of a Water License by the Northwest Territories Water Board, as well as several other permits and authorizations.

In addition to the regulatory requirements, an Environmental Agreement (EA) was negotiated with the Government of Canada and the Northwest Territories to address environmental concerns that were not covered by existing legislation and regulation (BHP Billiton, 2003b). The Environmental Agreement outlines the management, monitoring and regulation of the environmental effects of the mine (Table 3-2).

Table 3-2 Objectives of the Ekati Environmental Agreement (BHP Billiton, 2004c)

<table>
<thead>
<tr>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>To respect and protect land, water and wildlife and the land-based economy essential to the way of life and wellbeing of the Aboriginal peoples;</td>
</tr>
<tr>
<td>To facilitate the use of holistic and ecosystem-based approaches for the monitoring, management and regulation of the project;</td>
</tr>
<tr>
<td>To provide advice to BHP Billiton to assist BHP Billiton in managing the project consistent with these purposes;</td>
</tr>
<tr>
<td>To maximize the effectiveness and coordination of environmental monitoring and regulation of the project; and</td>
</tr>
<tr>
<td>To facilitate effective participation of the Aboriginal peoples and the general public in the achievement of the above</td>
</tr>
</tbody>
</table>

The Environmental Agreement also established the formation of the Independent Environmental Monitoring Agency (IEMA) which serves as a public watchdog for the regulatory process, and collects and reviews reports on environmental data, environmental effects, monitoring programs and the integration of traditional knowledge and experience into environmental plans (IEMA, 2004a). IEMA board members have considerable technical expertise and the Agency has a sufficient budget to hire additional experts to review Ekati reports. The IEMA is primarily funded by BHPB as stipulated.
by the Environmental Agreement. It represents the first such independent agency for environmental assessment follow-up for a mining project in Canada. The adaptive management approach taken by BHPB made it all the more important to have an effective monitoring and management program in place for the mine (Ross, 2004). The IEMA has no formal influence on environmental decisions made by the mine although it has significant indirect influence by participating as an intervenor in regulatory processes and other consultation forums.

The key regulatory agencies responsible for ongoing oversight of Ekati include the Departments of Indian and Northern Affairs Canada (INAC, commonly known as DIAND, the acronym of its predecessor) and the Fisheries and Oceans (DFO) and Environment Canada (EC) at a federal level, and the NWT Department of Resources, Wildlife and Economic Development (RWED) and the Mackenzie Valley Land and Water Board21 (MVLWB) at a territorial/regional level. The Canadian mining industry has complained of the uncertainty of the regulatory regime in the NWT due to a lack of clarity and coordination between the various regulatory bodies (NWT and Nunavut Chamber of Mines, The Mining Association of Canada, & The Prospectors and Developers Association of Canada, 2004).

Figure 3-2 shows a graphical summary of Ekati’s primary stakeholders and the major agreements that guide its consultation activities.

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21 The EKATI Diamond Mine was permitted under the Northwest Territories Water Act, which was replaced in 1998 by the Mackenzie Valley Resource Management Act (MVRMA). This Act resulted from the Gwich'in and Sahtu Comprehensive Land Claims Agreements and established the Mackenzie Valley Land and Water Board, with increased Aboriginal representation (MVLWB, 2003).
3.2 Consultation activities

3.2.1 Stakeholders

The major communities of interest affected by the project were determined by the Environmental Assessment Review Panel (EARP) to be Aboriginal groups from the surrounding regions shown in Table 3-1. These Aboriginal groups traditionally used the area where the mine is now located or waterways downstream of the mine. First Nations and Inuit have constitutionally protected rights to consultation and compensation regarding any developments on their traditional territories. The success of any mining project in Canada, particularly in the North, is dependent on a good relationship with Aboriginal stakeholders.

The regulatory agencies and the IEMA mentioned in Section 3.1.4 are also important stakeholders for the mine. There are also other groups that would fit the definition of a stakeholder as an individual or group who can affect or who is affected by a corporation’s
activities (Svendsen, 1998), although they were not active participants in the case study consultation process. The City of Yellowknife is also a stakeholder, although it could be argued that many of its socioeconomic interests are captured in the SEA and represented by the NWT government. The non-governmental organization (NGO) community also has a clear interest in the mine’s activities. Although the mining industry has not traditionally proactively engaged NGOs, there are signs that this is changing as these organizations have proved themselves effective at mobilizing popular opposition to projects and have considerable legitimacy in the eyes of the public. The Canadian Arctic Resources Committee (CARC) has been active voice in sustainable development discourse in the North for over 30 years and is perhaps the North’s most prominent NGO.

3.2.2 Pre-operation consultation
Consultation on the “NWT Diamonds Project” was initiated by the EARP, which held scoping meetings in early 1995 in eight communities in the Northwest Territories and Nunavut. It then issued the final guidelines for the environmental impact statement. When the environmental impact statement had been accepted, the panel held 18 days of project review public hearings. These were held in nine different communities in early 1996. Approval also required subsequent hearings in Yellowknife before the Northwest Territories Water Board (Ross, 2004).

BHP began some consultation directly with these Aboriginal groups in 1995. This intensified during the summer of 1996 when Indian Affairs Minister Ron Irwin (acting as the lead agency in the environmental assessment) gave the BHP diamond project conditional approval subject to “significant progress in sixty days” on IBAs and Environmental and Socio-economic Agreements (Bielawski, 2003). The Aboriginal groups were involved in three separate processes (water license hearings, IBAs and the Environmental Agreement), in addition to ongoing treaty (land claim) negotiations with the federal government for some groups. This ultimatum led to rushed negotiations that gave communities little time to develop an understanding of the possible impacts and a strategy for maximizing the benefits, according to Bielawski, a negotiator for the Akaitcho Treaty 8 Dene, based in Lutsel K’ee.
3.2.3 Current consultation activities

Ekati's consultation program is guided by its commitment made in agreements signed with its communities of interest before or at the start-up of the mine: the Environmental Agreement (EA), the Socio-Economic Agreement (SEA), and the four IBAs (see Figure 3-2). The consultation schedule includes regular meetings as conditions of these agreements, as well as mine site tours and presentations made by Ekati staff in response to requests (BHP Billiton, 2003c). Consultation and public participation activities undertaken by Ekati include the following, listed in order of increasing stakeholder participation:

- Publishing a quarterly newsletter that gives updates on mining activities and corporate community activities;
- Presentations about environmental monitoring programs to local high schools;
- Annual presentations and meetings in seven Aboriginal communities, including environmental management and socio-economic performance (including northern and Aboriginal employment, training and business opportunities);
- Tours of the mine site (Regulators with a direct role in environmental management at Ekati may visit the site several times each year). Aboriginal groups are invited annually to visit the mine to observe caribou migration and archaeological sites;
- Technical meetings with regulatory agencies on specific topics; and
- Project specific multi-stakeholder meetings and workshops (such as the meetings held recently for the LLCF 5 year optimization project).

Some consultation activities such as the annual community meetings are stipulated in the EA, while other are done on a project or issue-specific basis. Ekati used to hold annual environmental workshops to provide updates and elicit input on its monitoring programs each February. These plain language workshops were attended by all the key stakeholders (regulators, Aboriginal communities and the IEMA) and were preceded by technical group meetings during the previous December. Ekati ceased hosting these annual workshops and replaced them with a tri-annual workshop after 2003 because they
were considered to be unnecessary on an annual basis since the programs were well-established and not needing to be altered every year (Jane Howe, Ekati Permitting Coordinator, personal communication, Feb. 7, 2005). The annual workshop was regarded positively by stakeholders who were disappointed by its cancellation (Independent Environmental Monitoring Agency, 2004).

Regulatory stakeholders and the IEMA also organize and host consultation activities in which Ekati participates. The IEMA also plays a role in public participation with Ekati by acting as a forum for the interchange of information, between the company, Aboriginal communities, the general public and both levels of government, and provides an accessible public repository of environmental information relevant to the project.\textsuperscript{22} It also advocates to Ekati and governments the concerns of Aboriginal peoples and the general public and participates in Inter-Agency Coordination Team (IACT) meetings with Ekati and its regulators. In 2004 the IEMA organized an environmental workshop to replace the annual workshop formerly hosted by Ekati, and a mine closure and reclamation workshop that involved other stakeholders in the NWT/Nunavut mining sector was sponsored by INAC and facilitated by the IEMA.

The monthly or bimonthly IACT meetings are coordinated by INAC and include the IEMA and the regulators. IACT has a strongly technical environmental focus and its objective is communication to ensure that environmental activities related to the various regulatory requirements of the mine are carried out effectively and efficiently. This is important given the complexity of NWT’s regulatory environment.

\section*{3.3 Long Lake Containment Facility Five Year Review Process}

This section describes the context of the consultation meetings that were based on Multiple Accounts Analysis (a SDP described in Section 2.3.5) and were evaluated in this study.

\textsuperscript{22} All of the Agency’s reports and outgoing correspondence are made available on its website: www.monitoringagency.net.
3.3.1 Long Lake Containment Facility

The Long Lake Containment Facility (LLCF) was designed for storage of tailings (Processed Kimberlite, or PK) produced by the process plant, as well as treated wastewater from the camp (a small fraction of the overall volume). The facility consists of five cells (A to E) in a natural headwater basin, divided by intermediate dykes. The facility extends 7 km in a north-south direction and 3 km in an east-west direction and has a sufficient volume to contain the PK production over the entire life of the mine (Figure 3-3). The PK sent to the LLCF is allowed to settle onto the bottom and to become encased in permafrost (permanently frozen ground).

To date PK slurry has been deposited in the upper cells (B and C). The water drains towards the south and eventually into Cell E, which serves as a settling pond and provides sufficient storage capacity to contain all process-affected water until discharge water quality is met. This is currently achieved without a water treatment plant. Water management is done using pumping (including a reclaim barge in Cell D that pumps water back to the process plant) and a frozen-core dam at the outlet of Cell E.
Figure 3-3 Satellite image of Long Lake Containment Facility (courtesy of Ekati Diamond Mine)
Flocculant and coagulant are added in the process plant thickener to allow recycling of process water and the residual components of these settling additives help to maintain low levels of suspended solids in the LLCF, assisted by the intermediate filter dykes that allow water to pass through but trap suspended sediments. Since these two benign additives are the only two reagents used and the ore does not contain significant amounts of sulphides, the LLCF inherently has fewer water quality issues than metal mines, which often contain sulphides (and hence have Acid Rock Drainage potential) and use more toxic reagents (e.g., cyanide). The LLCF has reliably met water quality discharge requirements and is generally functioning as designed.

The currently approved abandonment and reclamation plan calls for covering the LLCF with a 1 m waste rock cover with a 150 mm topsoil/organic growth medium layer over the entire beach (above-water) surface. A suitable source of topsoil has not been found and there is an ongoing research program on direct vegetation of PK with local plant species to establish whether this is a viable option for meeting post-closure stability and environmental objectives.

### 3.3.2 Five-Year Review Process

When the Ekati Diamond Mine began operation in 1998, the LLCF was the only facility of its kind designed for storing kimberlite tailings (PK) in a sub-arctic climate. It utilized innovative technology such as thermosiphons to ensure rapid and continuous freezing of a water-retaining frozen core dam. As such, there were some uncertainties regarding how it would operate in practice, and water quality and the management of tailings water from Long Lake were central issues in the environmental assessment (Couch, 2002). In 2004, after five years of operating the LLCF without significant problems, Ekati had gained a better understanding of the facility and wanted to design and implement a new optimized PK management plan that would incorporate this knowledge, in accordance with the mine’s emphasis on adaptive management. Key “lessons learned” from five years of operation are summarized in Table 3-3.
Table 3-3 Summary of key lessons learned from five years of operating LLCF (BHP Billiton, 2004a)

- Beach angles of the sub-aerial (above water) PK are steeper than the design basis (1.8% vs. 1.2% design). This means that PK discharged from a spigot at a given elevation cannot travel as far, resulting less efficient use of the available storage volume without additional discharge points.
- Discharging PK at thickness greater than 1.5 m in the winter entrains ice in the PK that will not thaw during the summer and will permanently remain in the LLCF, reducing the available storage volume for solids. Discharge points should be varied to maintain a seasonal deposition of PK less than 1.5 m thick.
- Operating conditions for moving pipelines and discharge points during the winter are severe. Pipelines moves should be planned well ahead and carried out during the summer to the extent possible.
- PK weathers relatively quickly and breaks down into smaller clay-size particles, increasing its water retention (a benefit for revegetation) but also making it more susceptible to wind and water erosion.
- The PK beaches have poor stability and trafficability, meaning that operating equipment on the beaches is risky.
- The flocculants and coagulants, along with the filter dykes, have been effective in reducing suspended solids in the water.
- There is a paucity of cover soils, entailing a need for a different cover strategy than the original waste rock and topsoil cover. The direct PK vegetation program and test plots have been successful, indicating that establishing vegetation without topsoil is a possible viable component of an alternative cover strategy.
- Flow routing of closure drainage paths must be planned to avoid erosion of weathered very fine PK and ponding, which can lead to permafrost degradation and instability.

In summary the LLCF was operating as designed. The Five-Year Review Process represented an opportunity to further improve the management of the LLCF based on the lessons learned, rather than a response to problems with its operation. For example, a number of the options on the table involved placing more tailings in the upper cells (A, B and C) than the original design in order to maintain the downstream cells (D and E) as settlement ponds, adding another measure to improve the water quality ahead of the discharge point into the receiving environment. Since the Five-Year Review Process was convened proactively and involved a decision on an operating facility with a good track record, it was not as controversial as similar process on facility yet to be constructed, or an operating facility with significant problems.
Ekati hired Robertson Geoconsultants (RGC) to facilitate a risk assessment (FMEA) and an internal MAA of the LLCF in January 2004 to begin the process of developing a LLCF management plan (Wastewater and Processed Kimberlite Management Plan) for the next five years of operation. The management plan that Ekati would ultimately select would be submitted as an application to the MVLWB for permitting. The MVLWB permitting process would include a comment period to allow stakeholders to request clarifications and give input to Ekati regarding the plan. Ekati initiated the multi-stakeholder LLCF Five Year Review process in order to facilitate stakeholder input prior to the permitting process, with the aim of incorporating this input earlier and submitting a plan to the MVLWB already with substantial buy-in. This would serve to minimize the risk of permitting delays. The timeline of the Five-Year Review process is summarized in Figure 3-4 below.

Figure 3-4 Timeline of LLCF Five-Year Review
MAA, again facilitated by RGC, was the method chosen to structure the consultation process. Andy Robertson of RGC and Don Hayley of EBA Engineering Consultants Ltd., the primary designer and engineer of record for the LLCF, gave most of the presentations at the meetings. All the stakeholder groups participated in all three meetings. The role of stakeholder participation in the LLCF Five Year Review and the “big picture” of managing the LLCF were described in the first of the three meetings:

1. Monitor, investigate and study the performance of the LLCF during the first five years of operation and define the “lessons learned”;
2. From Ekati’s knowledge of lessons learned and knowledge of the management of processed materials generally, develop optimized options for the future development, operation and closure of the LLCF;
3. Evaluate the options using a methodology that is rational, clear, and transparent and allows all stakeholder issues and value bases to be considered. Based on this evaluation, select an option for future development, operation and closure of the Ekati LLCF.

These three parts are followed by:
- Preparation of detailed designs;
- Preparation of operating manuals;
- Preparation of closure plans;
- Permitting; and
- Implementation. (BHP Billiton, 2004a)

The first meeting was held on October 14th and 15th, 2004 at the Ekati mine site. The first day focused on providing background information, including the history and the design of the LLCF and included a tour of the facility. On the second day the key lessons learned were explained and measures for dealing with issues raised by this knowledge were introduced. The MAA methodology was also briefly introduced. Stakeholder involvement was mostly limited to clarifying topics raised in the presentations and raising concerns and interests regarding the management of the LLCF. A CD of the presentations was sent out to participants following the meeting.

The second meeting was held on December 14th and 15th, 2004 at a hotel in Yellowknife. The first half-day was basically a review of the first meeting for stakeholders who had
been unable to attend. The second day comprised a detailed overview of the three primary options, preliminary definition of the accounts and sub-accounts (evaluation criteria for the options) and further introduction to the MAA process. The options under consideration were designed by RGC prior to the meeting and there was not an opportunity for participants to modify the options presented or to create new ones. Stakeholder participation was actively solicited in developing accounts and sub-accounts in plenary to add to the preliminary list suggested by RGC based on their previous experience.

The third meeting was held on February 7th and 8th, 2005 at a hotel in Yellowknife. The first day was evenly divided between a review (of the MAA method, lessons learned, measures and options) and completing the MAA matrix (ledger) by rating and quantifying the relative impacts (scaling) and importance (weighting) of the accounts for each option. For example, Option 3a was given a rating of 7 (out of 9) for the indicator “ease of construction” in the “Construction” sub-account in the “Technical” account (see first line of MAA ledger in Appendix F). The indicator “ease of construction” was given a weighting of 9, the sub-account “Construction” was given a weighting of 9 and the “Technical” account was given a weighting of 6 (all out of 9). This was done interactively using a custom Excel spreadsheet projected onto a large screen. The MAA ledger was not complete at the end of the first day so the consultants and Ekati staff stayed into the evening to complete the scaling of the lower-concern accounts (e.g., project economics, operations). The second half-day began with a preliminary review of the results of the completed MAA ledger and a sensitivity analysis of the options. Sensitivity analysis involved varying the weightings assigned to accounts to determine if changing values would affect the ranking of the options. This was followed by questions and a discussion of the next steps in the larger process of developing and permitting a plan. Ekati agreed to send out electronic versions of the MAA ledger for stakeholder review and comment (a copy of which is included in Appendix F), complete with an added column explaining the key drivers and information gaps for each sub-account, as requested by some of the stakeholders. This was done in March 2005.
Of the five options evaluated in the MAA ledger at the third meeting, Option 3a was shown to be the preferred option, rating 8.0 (out of 9), as shown on the bottom line of the MAA ledger in Appendix F. This option involves constructing higher roads on Cells A and B in order to maximize the PK storage in Cells A, B and C. This delays the deposition of PK into Cell D for as long as possible and could possibly avert disposal into Cell D entirely if an exhausted pit becomes available for PK disposal in the future. Since water quality in the operating and post-closure phases of the LLCF is of great importance to stakeholders, maintaining Cell D as an additional settling pond for as long as possible appealed to all the parties. Options 3b and 3c were only slightly lower, rating 7.97 and 7.82, respectively, but Option 3a’s dominance was robust and various sensitivity analyses did not change the preference order of these options.

Ekati is not bound to implement the preferred plan from the MAA and has the prerogative of submitting a different plan to the MVLWB for permitting. However, it is most likely that the preferred option (or a refined version thereof) will be submitted since it has support from the stakeholders and Ekati staff.
Chapter 4 Methodology

4.1 Introduction

This chapter reviews the methodological approaches and techniques employed for data collection. The three components of the study are, in chronological order, participant observation of the Ekati LLCF Multiple Accounts Analysis (MAA) consultation process, a questionnaire at the conclusion of the MAA and interviews with MAA participants using the critical incident technique. The interviews are the primary source of data and the observation and questionnaire were designed to complement the interviews. As such, the interview component is discussed in much greater detail than the other two components. The research methodologies used in this study are primarily qualitative. For the present study, various qualitative and quantitative research methods were considered and the critical incident technique was chosen as the primary methodology for collecting interview data. The measures taken to ensure the credibility and trustworthiness of the data are described. The methods employed are discussed in general and the specific procedure for this study is detailed in this chapter.

4.2 Approach

The initial strategy for developing the study methodology was to identify a suitable set of relatively objective criteria for decision-focused stakeholder consultation and to evaluate the MAA process against these criteria. The literature review revealed a lack of consensus on such criteria, and the body of criteria that did exist was primarily developed for public participation activities initiated by government agencies, rather than corporations (as discussed in Section 2.2). Furthermore, the subjective experience and worldview of each stakeholder could strongly influence whether they considered the LLCF MAA process to be successful against almost any given criteria.

For these reasons an alternative strategy was chosen that would allow criteria to emerge from the data, rather than choosing a somewhat arbitrary set of criteria a priori. This inductive approach was best suited to qualitative research methods. An inductive
approach reasons from known facts (e.g., data collected) rather than from general principles (e.g., evaluative frameworks from the literature) as with a deductive approach.

The use of qualitative research methods in engineering research is non-traditional. Engineering involves the application of science and mathematics to solve practical problems. Traditionally this has been restricted to the natural sciences. For this reason engineering has implicitly embraced the dominant experimental/quantitative paradigm of the natural sciences. This paradigm values deductive reasoning, quantitative measures, experimental design and statistical analysis and is influenced by the philosophical tenets of logical positivism.\textsuperscript{23}

An alternative paradigm emerged in the second half of the 20\textsuperscript{th} century to challenge the supremacy of the dominant paradigm in both the natural and social sciences. The alternative naturalistic/qualitative paradigm came out of the tradition of anthropological field studies and is undergirded by the philosophical tenets of phenomenology.\textsuperscript{24} This paradigm relies on qualitative data, naturalistic inquiry, and detailed description derived from close contact with the people in the setting under study, and uses the techniques of in-depth, open-ended interviewing and personal observation. It emphasizes understanding the meaning behind actions/human behaviour.

The approach of this study was not based on strict adherence to either one of these research paradigms, but rather an appreciation that both have led to the creation of useful research methods. To answer the research question, predominantly qualitative methods were deemed most appropriate. Although the topic of this study involves a range of techniques and perspectives outside the traditional domain of an engineering thesis, it was conducted under the auspices of a mining engineering program. Engineers play important roles in consultation as communicators of technical knowledge; however, they

\textsuperscript{23} Logical positivism is a philosophy asserting the primacy of observation and experiment in assessing the truth of statements of fact and holding that metaphysical and subjective arguments not based on observable data are meaningless (Merriam Webster, 2004).

\textsuperscript{24} Phenomenology is a philosophy asserting that reality consists of objects and events as they are subjectively perceived or understood in human consciousness and not of anything independent of human consciousness (Merriam Webster, 2004).
are often ill equipped to communicate in "plain language" with non-technical audiences. SDPs are a potentially valuable tool for engineers to bridge the gaps in knowledge (both technical and non-technical) and worldview that they encounter in the context of consultation. Furthermore, approaching this study as a mining engineer has allowed me access to a mining company-initiated process that perhaps might have been inaccessible to a non-engineer.

The central empirical component of this thesis is evaluation of the case study consultation process. Patton (1997) exhorts evaluators to know the intended use (and users) of an evaluation. Some evaluations focus on one of these three uses described in Section 2.2.1 (i.e., summative, formative, knowledge-generating), but this thesis contains elements of all three. The questionnaire and interviews allowed participants in the LLCF MAA process to both make a summative judgment on the merit of this particular consultation process, as well as suggesting formative improvements for future MAA consultation processes. Their summative judgment is admittedly interim, in the sense that the participants do not have the benefit of knowing the longer-term outcomes (e.g., what management plan will ultimately be submitted for permitting). Finally this thesis aims to contribute to the scholarly body of knowledge on public participation and decision analysis/SDPs, as well providing insight to mining companies and their stakeholders who may seek to use such processes in the future.

4.3 Credibility and trustworthiness in research

Most researchers seek a research design that:

1. Accurately describes the phenomenon under investigation;
2. Consistently allows fair comparisons between subjects or populations; and
3. Enables the knowledge acquired to be applied to other populations and contexts.

These objectives relate to the individual data collection techniques as well as to the study as a whole. Qualitative and quantitative research methods have evolved from different
traditions, and have therefore developed different approaches and evaluative criteria for answering these questions (Krefting, 1990). Quantitative researchers address the above three questions using the parameters validity, reliability and generalizability as evaluative criteria. Qualitative researchers address the same concerns but many argue that the three parameters as understood in quantitative research are not applicable to most qualitative studies (Lincoln & Guba, 1985). Within the qualitative tradition, reliability and validity are instead discussed in terms of credibility and trustworthiness. Patton (1990) suggests the following three criteria for establishing the credibility of qualitative inquiry.

1. Rigorous techniques and methods for gathering high-quality data that is carefully analyzed, with attention to issues of validity, reliability and triangulation;
2. The credibility of the researcher, which is dependent on training, experience, track record, status, and presentation of self; and
3. Fundamental appreciation of naturalistic inquiry, qualitative methods, inductive analysis and holistic thinking.

Addressing these criteria in a credible qualitative study leads to the following practical questions:

"What techniques and methods were used to ensure the integrity, validity and accuracy of the findings?"

Transparency and triangulation are examples of such methods. Transparency entails the clear and explicit reporting of qualitative procedures in order that, “a.) The reader will be confident of, and can verify, reported conclusions; b.) Secondary analysis of the data is possible; c.) The study could in principle be replicated; and d.) Fraud or misconduct, if it exists, will be more trackable.” (Huberman & Miles, 1994, p. 439). Triangulation involves the use of convergent sources of methods or data to reduce systematic bias in the data (Krefting, 1990; Patton, 1990). There are four types of triangulation that contribute to the verification and validation of qualitative analysis:

25 For a more detailed discussion on validity, reliability and generalizability for quantitative methods, see for example Gliner & Morgan (2000).
• methods triangulation: checking out the consistency of findings generated by different data-collection methods (usually through comparing qualitative and quantitative data);
• triangulation of sources: checking out the consistency of different data sources within the same (qualitative) method (e.g., comparing observational data with interview data);
• analyst triangulation: using multiple investigators or analysts to collect or review findings. This can include having multiple researchers or those who were studied review the findings; and
• theory/perspective triangulation: using multiple perspectives or theories to interpret the data (Patton, 1990).

"What does the researcher bring to the study in terms of qualifications, experience and perspective?"

Since the researcher is effectively the "instrument" in qualitative inquiry (in contrast to quantitative inquiry in which the instrument may be a piece of laboratory equipment, for example), a qualitative report must include information about the researcher. There is no definitive list about what information should be provided, but the guiding principle is to report any personal or professional information that may have affected data collection, analysis and interpretation, either negatively or positively. There are four ways that the presence of a researcher can distort the findings of a study:

• reactions of study participants to the presence of the researcher (i.e., Hawthorne effect);
• changes in the researcher (the measuring instrument) during the course of the study (i.e., analogous to instrument error);
• the predispositions or biases of the evaluator; and
• researcher incompetence (including lack of sufficient training or preparation) (Patton, 1990).
The above list illustrates that rigorous qualitative research requires both technical competence and self-awareness on the part of the researcher. The latter is often called reflexivity and involves the continual assessment of personal perceptions and experiences that may influence the research process (Krefting, 1990).

4.4 **Observation**

Direct observation involves the researcher observing and recording the behaviours of the participants in a study.\(^{26}\) Observational techniques vary in the following dimensions:

- **Naturalness of the setting.** The setting for the observations can vary from natural environments (such as the home or office) to highly controlled settings (such as used in a hospital or psychological laboratory). Qualitative researchers observe almost exclusively in natural settings, while quantitative researchers use the whole range of settings.

- **Degree of observer participation.** This can vary from situations where the observer is a full participant to settings such as public places in which the observer is entirely unobtrusive. Most observations, however, are done with the awareness and consent of participants.

- **Amount of detail.** Observers record data that varies from summaries for the whole observation period to moment-by-moment records of observed behaviours. The latter provides more detail and requires considerable training and preparation of observers. Detailed records may employ codes for various behaviours or describe everything that happens in sequential order in a narrative form.

- **Breadth of coverage.** Observation schemes may attempt to record many different things happening in a person's environment or focus on a few, specific types of behaviour, such as task-directed behaviours (Gliner & Morgan, 2000).

The primary advantage of observation is that the researcher can see what people actually do, rather than relying on reports of what people say they do. This approach can reveal

\(^{26}\) Indirect observation, in which the researcher interviews untrained observers such as parents or teachers about participants they know well (e.g., children), is another means of collecting data (Gliner & Morgan, 2000). However, this technique is not applicable to this study.
more about what actually takes place than a respondent might report in an interview. Also, observation might reveal valuable unexpected findings since participant behaviours are in no way limited to the domain of the pre-determined research questions. Disadvantages include difficulty in gaining access to private actions or events and that the presence of the researcher can change the way subjects behave due to their awareness of being studied (known as the Hawthorne effect) (Brym, 2001). Direct observation is also time-consuming for the researcher.

4.5 Questionnaires

Questionnaires are any group of written questions to which participants are asked to respond in writing. Questionnaires vary from highly structured with close-ended questions in which the respondent picks one of a specified list of specified responses, to less structured with open-ended questions that allow the respondent to formulate a response in his or her own words (Gliner & Morgan, 2000). Questions may ask about behaviours (i.e., what a person does or has done), opinions (i.e., what a person thinks about something), feelings (i.e., emotional responses to thoughts and experiences) and knowledge (i.e., what factual information a person has) (Patton, 1982). Questionnaires may be mailed to a sample population or directly administered to a group of people who are assembled in a certain place for a specific purpose. The main advantage of directly administered questionnaires is that a high response rate is typically obtained (Gliner & Morgan, 2000). In general the advantages of questionnaires include standardization and reliability, greater anonymity for respondents and less expense.

4.6 Interviews

Much like questionnaires, interviews can vary from what amounts to a highly structured oral questionnaire with close-ended answers to in-depth interviews with more open-ended questions. In-depth interviews are often recorded and subsequently transcribed so that the participant's comments can be analyzed or coded. The advantages of interviews include the ability to clarify answers by probing the respondent and greater control and adaptability of data collection. This results in greater depth and richness of data,
particularly in understanding how respondents interpret and formulate their responses to
the questions. Interviews also have higher response rates than other methods of data
collection and are particularly useful for questioning people who cannot write their own
responses (because of illiteracy or other factors). Conducting interviews (and analyzing
interview data) is relatively expensive because of their one-to-one nature. Another
disadvantage is that they are prone to the ‘the interviewer effect’; attributes of the
interviewer such as age and ethnicity can affect the responses received (Gliner &
Morgan, 2000).

4.7 Critical incident technique

The methodology chosen for the interviews in this study is critical incident technique
(CIT). The basic premise of CIT is to interview respondents and ask them to describe
incidents or factors that helped or hindered an activity or process. The researcher then
analyzes and organizes these “critical incidents” that the respondents have described
during the interviews into logical themes. CIT is in the middle of the spectrum between
quantitative and qualitative extremes in social science methodology (Norman Amundson,
personal communication, Oct. 14, 2004). An important advantage of the CIT over purely
quantitative research design with close-ended questions (e.g., only using questionnaires)
is that participants do not feel forced to give an opinion about any given attribute or
criteria, but are rather free to comment on what they felt was significant. This is
important given the uncertainty regarding what public participation criteria are
appropriate for this context (corporate-initiated consultation). The CIT also provides a
clear and rigorous methodology for discovering these criteria inductively that may not be
present in more open-ended qualitative methods, such as phenomenology.

4.7.1 Description & Procedures

The following five steps are involved in a CIT study (Flanagan, 1954):

1. Defining the topic of the study and a broadly defined statement of objectives for
   the activity: This serves as a point of reference against which the critical incidents
to be collected can be judged as helping or hindering, positive or negative. In this
case, the topic of the study was the LLCF MAA consultation process. The objective of the activity was to decide on a preferred LLCF management plan that met the interests of all the participants.

2. Setting plans and specifications for collecting the critical incidents: The means for collecting the critical incidents (e.g., direct observation or interviews) are selected and the definition of what constitutes a "critical" incident is specified. In this study the decision was made to collect critical incidents from participants using interviews conducted after the consultation process was over. For research such as this study that relies on retrospective self-report, what was determined to be a critical incident was largely left to the discretion of the participants in the activity. In other words, participants were asked what specific factors of the MAA process they did or did not consider to be helpful and the incidents they reported were accepted at face value.

3. Collecting the data: This is usually done by interviewing respondents after the activity or process of interest (also called retrospective self-report). It could also include direct observation of the activity by researchers, or having participants record critical incidents independently (i.e., in a journal or logbook). In this case, participants were interviewed at the conclusion of the three meetings.

4. Analyzing the data: A categorization scheme is created to summarize the data while "sacrificing as little as possible of their comprehensiveness, specificity, and validity" (Flanagan, 1954, p. 344). This is considered to be the most important and difficult step in the CIT process (Flanagan, 1954; Woolsey, 1986). Formulating the categories (themes) is an inductive and iterative process of logically grouping the critical incidents using the judgment of the researcher. For this study the interviews were recorded and each critical incident that was reported to have helped or hindered was transcribed. Using a system of progressive readings, the researcher then placed the critical incidents into logical groups. For example, numerous participants reported, in different words, that something they liked about the process was that they had the opportunity to learn about the LLCF. Thus, after numerous readings, and after sorting through the critical incidents, the researcher identified that a major theme was "Learning."
5. Interpreting and reporting the data: The four preceding steps are re-examined to determine what biases may have been introduced by the procedures used and the judgments made. Employing credibility checks is a means of systematically testing for biases. In this study, an impartial third party was given a random list of critical incidents and was asked to sort them into thematic groupings. His results were compared with the researcher’s original groupings. Details regarding the outcome of this reliability check are reported in Section 4.9.5.

CIT studies should aim for a minimum of 15-20 interviews (Norman Amundson, personal communication, Oct. 14, 2004), although strictly speaking the sample size is defined by the number of critical incidents observed or reported, not by the number of participants (Flanagan, 1954). There is no set rule for how many incidents are sufficient, apart from the general guideline that they must adequately cover the content domain of the activity. A typical CIT study will include at least several hundred critical incidents. Concept saturation is reached when additional critical incidents do not add significantly to the number of themes.

4.7.2 Evolution & Applications

The critical incident technique was developed during World War II in the Aviation Psychology Program of the United States Army Air Forces (USAAF) for selecting and classifying aircrews. Over the past 50 years CIT has been utilized in a wide array of disciplines beyond its roots in industrial and organizational psychology, in part due to its flexibility. According to Flanagan (1954): “[CIT] does not consist of a rigid set of rules governing such data collection. Rather it should be thought of as a flexible set of principles that must be modified and adapted to meet the specific situation at hand” (p. 335).

Butterfield, Borgen, Amundson and Maglio (2004) describe in greater detail the range of applications of the CIT and point out several major departures from the way Flanagan (1954) envisioned the method that are significant for this study. The authors point out that CIT was initially very behaviourally grounded, with data being collected by trained
observers or experts recording observations of human behaviour, either by direct observation or by workers keeping diaries at work. Flanagan’s (1954) definition reflects this original emphasis: “The critical incident technique consists of a set of procedures for collecting direct observations of human behaviour in such a way as to facilitate their potential usefulness in solving practical problems and developing broad psychological principles” (p. 327).

The method has since also been applied to studying experiences, reflecting the trends towards postmodern or constructivist approaches in the social sciences. Woolsey (1986) cites CIT’s flexibility in being able to encompass factual happenings, qualities or attributes, not just critical incidents, as a key strength. Retrospective self-report has all but replaced direct observation as the preferred method for collecting critical incidents in the past 15 years, likely because it is very labour intensive and therefore expensive to gather data by recording it as it occurs (Butterfield et al., 2004).

4.7.3 Establishing credibility of the critical incident technique

Ensuring the credibility of results is a crucial concern for any research method. Studies by Andersson and Nilsson (1964) and Ronan and Latham (1974) affirmed the reliability and validity of the CIT in its traditional research context of job analysis. Further procedures for establishing the credibility of CIT research in its contemporary applications have also been developed. Butterfield et al. (2004) describe nine separate credibility checks that include recording interviews, cross-checking of incidents and categories by CIT experts and study participants and clearly stating the underlying assumptions that guide the study.

Flanagan (1954) also proposed a general guideline for determining which incidents are credible and to be included as a critical incident for analysis. He suggested that full, precise details about the incident provided by the participant/observer indicate accuracy, while general or vague descriptions mean the incident is not well remembered and should therefore be excluded.
The combination of these checks enhances the credibility of the findings because the research protocols consistent with the CIT method are being followed (Creswell, 1998).

4.8 Participants

Participants in this study are people who participated in the Ekati Diamond Mine LLCF Multiple Accounts Analysis consultation process. Further information about participants is included in Section 5.0.

4.8.1 Selection process and recruitment

A purposeful sampling design was used to select study subjects. A purposeful sampling design involves selecting individuals who are likely to be “information-rich” with respect to the purposes of a study (as opposed to random sampling for example). Since this study examines a general question – the applicability of decision analysis to consultation in the mining industry- primarily by studying a particular case study, the sampling frame is necessarily constrained to individuals with experience and knowledge of the case study.

Critical incident techniques studies typically aim for a minimum of 15 to 20 interviews, with upper limits constrained only by time and resources. Since the total population of MAA participants was relatively low, I endeavoured to include all the participants in the sample, knowing that for various reasons some MAA participants would not choose to participate in my study. Obviously participants who attended all three of the meetings would provide the richest data, but I decided to include even participants who attended only one meeting both to gather their impressions of the meeting they attended and to understand their reasons for not attending the other meetings.

Participants were recruited in several steps. A letter of initial contact (see Appendix B) was sent out to the stakeholders invited to the LLCF MAA two weeks prior to the first meeting, briefly explaining the study and indicating my desire to administer a questionnaire and conduct interviews. At the start of the each of the meetings I again introduced my research project and explained how I would be collecting data. I also
spoke with a large number of the MAA participants informally during breaks in the meetings to express the importance of hearing their opinions in the interview stage. Finally, at the end of the questionnaire (see Appendix C) a request for contact information was included to arrange interviews with those who were interested. Prior to third and final meeting an email was sent to MAA participants to remind those from outside of Yellowknife to remind them to allow for an interview in their travel schedule if they so desired.

4.9 Study procedures

This section describes the procedures used in the study. These procedures were reviewed by the University of British Columbia Behavioural Research Ethics Board. A copy of the approval form is included in Appendix A.

4.9.1 Observation of MAA

I was present as an observer at all three MAA meetings. In addition to providing an additional source of data to verify (triangulate) the self-reported data provided in the questionnaires and interviews, this provided me with an opportunity to talk informally during breaks with most of the participants and to build rapport that would facilitate the interview process after the MAA.

In terms of the dimensions of observational methods mentioned in the section 4.4, the MAA was held in a natural setting for mine consultation activities, with the first meeting taking place in the offices at the Ekati mine site and the last two meetings were held in hotels in Yellowknife. The majority of participants appeared to know each other personally from previous consultation processes and venues such as the Inter-Agency Coordination Team.

I was a passive participant in the MAA process. I attended all the meetings but tried to be unobtrusive and did not contribute to the discussion as would a full participant representing one of the stakeholder groups. The MAA participants were sent a brief letter of introduction describing my study prior to the first meeting (which was also a
requirement of the university ethical review process). I also introduced myself and briefly explained my research project at the start of each meeting for participants who did not attend the previous meetings.

I recorded only summary level data from the meetings without a pre-existing coding system. I took some notes during the meetings and wrote a daily summary of my impressions at night. My observations had a wide breadth of coverage of behaviours and conditions. I noted anything that I thought might influence participants' perceptions of the process, from the physical layout and acoustics of meeting rooms, to the manner in which challenging questions were answered. Particular attention was paid to the tone of discussions (i.e., collaborative or adversarial), the nature and frequency of questions and the attentiveness of participants.

4.9.2 Evaluation questionnaire

A brief questionnaire was given to the participants at the end of the third and final MAA meeting (see Appendix C). The purpose of the questionnaire was twofold: to give a quantitative "snapshot" of participants' overall perceptions of the MAA, and to elicit information on participants' previous experience with consultation and SDPs that would help to guide subsequent interviews (see Appendix E). Questions were carefully chosen to avoid introducing specific evaluation criteria (e.g., learning, cost-effectiveness) that could bias the critical incident technique interviews. The questionnaire was composed of primarily close-ended questions.

The first section of the questionnaire (Initial Information) asked personal and factual information of the respondent, including what organization they represented at the MAA consultation process. This allowed an assessment of the relative satisfaction with the MAA process between the different types of stakeholders (e.g., regulator, Aboriginal community).

The second section (Consultation Experience) asked about respondents' previous experience with consultation with the Ekati Diamond Mine (see Section 3.2.3 for a
description of Ekati's consultation activities) and with the use of structured decision-making processes in consultation in general. This provided an understanding of the "baseline" level of consultation experience participants had as a reference against which they could compare the MAA process.

The third section (LLCF Multiple Accounts Analysis) requested the respondent to provide global summary opinions on his or her agreement with the outcome of the MAA and the use of MAA in future consultation processes, using a Likert-type summated attitude scale (i.e., ranging from Strongly Agree to Strongly Disagree). The final section (Concluding Remarks) of the questionnaire included a space for open-ended comments and a request for contact information and indication of interest for conducting an interview.

4.9.3 Interviews

Face-to-face interviews were conducted in Yellowknife from February 8th to 14th, 2005 and took places in respondents' offices or restaurants. The final five interviews were completed by phone between February 23rd to March 2nd, 2005 since face-to-face interviews were not possible. Interviews were scheduled at a time and location convenient for each interviewee. The nominal duration of the interviews was one hour and the actual duration varied from 25 minutes to one hour. The interviews were tape-recorded for later selective transcription. Respondents were told that they could turn off the tape recorder at any time if they so chose. All participants read and signed an interview consent form (see Appendix D).

A standardized, open-ended interview style was used consisting of "a set of questions carefully worded and arranged for the purpose of taking each respondent through the same sequence and asking each respondent the same questions with essentially the same words" (Patton, 1982). A copy of the interview guide is included in Appendix E. The interview had three sequential parts. I opened the interview by briefly reviewing and clarifying the respondent's questionnaire responses regarding his or her past experience with consultation and structured decision-making processes. Beginning the interview
with easy descriptive questions was intended to help the respondent feel comfortable in the interview setting. This questioning strategy is recommended by Patton (1990).

The second and most important part of the interview used the critical incident technique (CIT) described in Section 4.7. Each research method has its own constraints and strengths (Eisner, 2003) and the CIT was selected because of its fit with the objectives and context of this research project. In particular the CIT is flexible and open-ended enough to allow respondents to evaluate the MAA in their own words without pre-imposed categories, yet still provides a rigorous procedure for identifying themes from the data collected.

In this part respondents were asked to give specific examples of things that they liked about, or considered to be strengths of the LLCF MAA process. Vague examples were probed for full, specific details to ensure the accuracy of the incident as recommended by Flanagan (1954) (e.g., “Can you think of a specific example when this [characteristic] was demonstrated?”). After each incident the respondent was asked, “What else did you like?” until he or she could give no more examples. The respondent was then asked if there were any things they disliked about the first meeting, and the same process was repeated until no more examples we given.

This process of giving an overview, then asking for examples of positive and negative factors was repeated for the second and third meetings. Respondents were presented with pictures taken at the first and second meetings prior to asking about each of these respective meetings, to serve as a memory-trigger since over three months had elapsed since the first meeting. I closed this part of the interview by asking the respondents if they could think of anything else they liked or disliked about any part of the MAA process.

In the third part of the interview respondents were asked a mix of more specific open-ended and closed questions. The first of these questions (Question 7 on the interview guide) asked why the respondent had missed meetings, if this was the case. The intent of
this question was the gauge whether absenteeism was due to schedule conflicts with other unavoidable commitments, or due to dissatisfaction with the LLCF MAA process. Question 8 elicited suggestions on how the MAA could be improved, apart from ideas that came up in the critical incident section. Question 9 whether they could think of another consultation process that would have been better than MAA in this particular context. This was designed to check that my line of questioning did not solely focus on how MAA could be improved without considering if there was another consultation method that was altogether superior to MAA. The final two questions asked the same global summary questions (using the same Likert-type summated attitude scale) that had been asked on the questionnaire. I introduced these questions by saying that I was asking them again to check if the process of reflecting on and talking about the LLCF MAA process had changed their opinions. They also allowed me to gather summary opinions from respondents who had not filled out a questionnaire. Before closure of the interview respondents were given an open-ended opportunity to add any final comments on the MAA or consultation with Ekati.

4.9.4 Data analysis

The analysis of the observation data was informal rather than systematic. Attending the meetings as a participant observer was very valuable for grounding my prior conceptions of how the MAA would transpire. Since there was a considerable time lag between the start and the finish of the MAA process (nearly three months) I was able to use my observation data from the first two meetings to refine the questionnaire and interview questions prior to the third meeting.

The questionnaire results were reviewed and any relevant responses from a particular respondent such as consultation experience and overall satisfaction with the LLCF MAA process were noted on the interview form for that respondent. Simple averages and variances were calculated for the Likert-scale questions using a 1 to 5 numerical conversion (i.e., Strongly Disagree (SD) = 1, Strongly Agree (SA) = 5).
The first step in analyzing the interview data was transcribing of the critical incidents from the interview tapes. Any incidents reported by respondents that were overly vague were discarded. Once all the critical incidents had been transcribed, then they were sorted into preliminary themes (categories) that were judged to capture the meaning of the incident. These themes were refined throughout the analysis process. A list of the critical incidents with their associated themes from each interview was sent to each respondent to cross-check the appropriateness of the categories and review what quotes had been identified as critical incidents. After the themes were finalized, minor themes that included critical incidents from less than 25% of the respondents were discarded, as suggested by CIT researchers (Butterfield et al., 2004). Note that minor themes are summarized in Section 5.5.4.

4.9.5 Credibility and trustworthiness of study

This section summarizes the measures taken to ensure the credibility of the study and its findings. The study procedures and instruments were described in detail in this chapter; this transparency allows the reader to understand how the data was collected and analyzed and make a judgment of its merit. Triangulation was also used, comparing observation, questionnaire and interview data against one another. I also endeavoured to exhibit reflexivity throughout the study through reflection on my experience during both data collection and analysis.

Specific measures taken to ensure the credibility of the CIT method included having an experienced CIT researcher independently sort a random sample of 25 critical incidents into themes. The intercoder reliability was 88%, above the recommended minimum of 80% (Norman Amundson, personal communication, Oct. 14, 2004). Also, each respondent was sent a list of the critical incidents gathered in his or her interview, along with the themes tentatively assigned to them, and asked to notify me if I had misunderstood any of their comments and assigned an inappropriate theme. Several respondents replied to clarify or correct a statement they had made to ensure that I had understood their meaning, while others affirmed that the themes summarized their thoughts well.
Chapter 5 Results

5.1 Overview

A total of 35 people participated in at least one of the three LLCF MAA meetings, not including the two consultants who facilitated the MAA. The average daily attendance at the first, second and third two-day meetings was 23, 32 and 22 persons, respectively. Of the total of 35 participants, nine people were not included in the study because they were not present at the third MAA meeting when the questionnaires were handed out and did not return questionnaires sent by email.

A total of 14 organizations participated in the LLCF consultation meetings. The participating organizations were divided into the following five categories according to their mandate and characteristics:
• **Company**: Ekati Diamond Mine (BHP Billiton Diamonds);

• **Consultants to Ekati**: Robertson Geoconsultants,\(^{27}\) EBA Engineering Consultants, HMA\(^{28}\) and Rescan Environmental Services;

• **Regulators**: Indian and Northern Affairs Canada (INAC, also known by its former acronym DIAND), Fisheries and Oceans Canada (DFO), Environment Canada, Government of Northwest Territories Resources, Wildlife and Economic Development (RWED), Mackenzie Valley Land and Water Board (MVLWB);

• **Communities**: Yellowknives Dene First Nation, Lutsel K’e Dene First Nation, Kitikmeot Inuit Association (KIA); and

• **NGO**: Independent Environmental Monitoring Agency (IEMA).

### 5.2 Participant demographics

A total of 26 respondents (out of the 35 people who participated in at least one of the LLCF meetings) either completed a questionnaire, or participated in an interview, or both. This is a participation rate of 74%. The complete list of study respondents (with names omitted to protect respondents’ confidentiality) is presented in Table 5-1 below. The age range of the respondents is estimated to be from mid-twenties to early sixties and the gender distribution was approximately 60% male and 40% female.

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\(^{27}\) Robertson Geoconsultants facilitated the LLCF MAA process, as well as having providing technical and design input during the meetings. Therefore, RGC staff are not included in study.

\(^{28}\) Full name of organization not given to protect the confidentiality of the participant.
## Table 5-1 Summary of Study Respondents

<table>
<thead>
<tr>
<th>#</th>
<th>Organization</th>
<th>Role within Organization</th>
<th>Meeting Attendance</th>
<th>Questionnaire</th>
<th>Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HMA</td>
<td>Principal Agrologist</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>2</td>
<td>IEMA</td>
<td>Board Member</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>3</td>
<td>KIA</td>
<td>Lands and Water Technician</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>4</td>
<td>MVLWB</td>
<td>Regulatory officer</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>5</td>
<td>Yellowknives Dene</td>
<td>Representative/advisor</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>6</td>
<td>RWED</td>
<td>Manager of Environmental Assessment</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>RWED</td>
<td>Industrial Specialist-Mining, Environmental Protection Service</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Environment Canada</td>
<td>Water Pollution Specialist, Environmental Protection Branch</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>9</td>
<td>DFO</td>
<td>Fish Habitat Biologist</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>10</td>
<td>Ekati</td>
<td>Chief Engineer</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>11</td>
<td>Ekati</td>
<td>Reclamation specialist</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>12</td>
<td>INAC</td>
<td>Environment and Conservation Division</td>
<td>X</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Ekati</td>
<td>Manager of Process Plant</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>14</td>
<td>Ekati</td>
<td>Permitting Coordinator</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>15</td>
<td>Ekati</td>
<td>Environmental Manager</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>16</td>
<td>IEMA</td>
<td>Environmental Analyst</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>17</td>
<td>DFO</td>
<td>Fish Habitat Biologist</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>18</td>
<td>Lutsel K'e Dene</td>
<td>Manager, Lands &amp; Environment</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>19</td>
<td>Lutsel K'e Dene</td>
<td>Community member, Representative of Wildlife Committee</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>20</td>
<td>INAC</td>
<td>Resource Management Officer</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>21</td>
<td>IEMA</td>
<td>Board Member</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>22</td>
<td>EBA</td>
<td>Principal Engineer</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>23</td>
<td>INAC</td>
<td>Water Resources</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>24</td>
<td>Rescan</td>
<td>President</td>
<td></td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>25</td>
<td>INAC</td>
<td>Unknown</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>26</td>
<td>IEMA</td>
<td>Board Member</td>
<td>X</td>
<td>X</td>
<td>Y</td>
</tr>
</tbody>
</table>
5.3 Observation

Although each of the three meetings differed slightly, my observations from all the meetings were fairly consistent. Almost all of the participants appeared to know each other from previous meetings and the atmosphere was collegial. Participants were respectful towards one another in the discussions and disagreements on particular issues did not affect the overall tenor of the meetings. Most participants were active in the discussions. Participants from the IEMA were more vocal and explicit about their agenda than other participants.

The presentations were well structured and used a lot of graphics support such as pictures, graphs and large wall posters of the options under discussion. Questions from the audience seemed to reflect a genuine interest in understanding the concepts that were being presented, despite their often complex nature. Fitting all the presentations and discussions into the agenda was often a challenge, particularly in the third meeting. At the end of the first day of the third meeting, the MAA ledger had not yet been completed (as scheduled) so Ekati staff and consultants worked into the evening after the others had left completing sections of the ledger that were less important to external stakeholders (e.g., operations and costs). This was necessary to complete the MAA ledger for next morning so that there would be enough time for sensitivity analysis and review.

All of the meetings were conducted in plenary (i.e., as one large group) and some participants appeared to lose interest during some fairly technical discussions between the presenters and technical experts amongst the participants. Although the majority of participants were fully present and attentive during the meetings, several participants appeared to be distracted by other duties during the second and third meetings, which were held in Yellowknife. For example, some participants worked on laptops or left the room to take lengthy phone calls.

In summary, everyone involved in the meetings appeared to participate in good faith and no one tried to block the process or drastically change the agenda of the meetings.
5.4 Questionnaire

The questionnaire was designed to gather background information for the interviews and to gather the opinions of MAA participants who would be unwilling or unable to participate in an interview. Since the last day of the final meeting went half an hour over time, some participants had to leave early for other scheduled commitments. I gave these participants who were unable to stay and fill out the questionnaire immediately a copy and asked if I could pick up their completed questionnaire at the interview. I also arranged to e-mail an electronic copy of the questionnaire to participants who would not be able to do a face-to-face interview or who did not attend the final day of the third meeting. Of the 20 questionnaires that were returned, eight were filled in immediately after the final meeting, four were collected at interviews and eight were completed electronically and returned by e-mail.

5.4.1 Consultation Experience
All but four of the respondents had participated in previous consultation processes with Ekati. The average length of experience in consultation with Ekati was just over four years, and ranged from no experience to 14 years (dating back to the start of the environmental assessment process). Most respondents had participated in a wide range of consultation and communication activities that included public hearings, IACT meetings, site visits to the mine and environmental monitoring program workshops; some of the more experienced respondents had also participated in community meetings and served on Environmental Assessment review panels for other projects.

5.4.2 Experience with decision analysis in consultation
Respondents’ experience with structured decision-making processes in multi-stakeholder contexts (consultation) is shown in Figure 5-1.
Half of the respondents had no previous experience with decision analysis or had some exposure only in university courses. Thirty-one percent had at least some experience with decision analysis in a professional setting, but not in a multi-stakeholder context. This group includes the five Ekati staff and respondents who participated in an internal MAA on the LLCF in January 2004. The remaining 19% of respondents, six in total, had experience with structured decision-making processes in consultation (although not MAA specifically). The context of this previous experience included regional and municipal planning exercises, mine reclamation plan selection and urban transportation planning. Two of these respondents had only provided technical input and were not directly involved in the decision process. Another respondent’s experience was with a decision analysis process that was conducted internally, the results of which were communicated to stakeholders in a consultation process.

5.4.3 **Assessment of LLCF Multiple Accounts Analysis**

The responses to the following summary questions were quantified on a 5-point interval scale, from “Strongly Disagree” = 1 to “Strongly Agree” = 5, and the average scores from the questionnaire are shown:
- "I am satisfied with the outcome of the MAA." Average score 3.79 out of 5, individual responses ranging from Disagree to Strongly Agree.
- "I would recommend the use of MAA in future consultation processes." Average score 4.00 out of 5, individual responses ranging from Undecided to Strongly Agree.

Only one respondent answered Disagree to the first summary question. Any additional comments on the free-form section of the questionnaire were included as possible critical incidents, along with those taken from the interviews, for the critical incident component of the study.

5.5 Interviews

Twenty-two interviews were conducted, satisfying the suggested critical incident technique suggested minimum of 15-20 interviews (Norman Amundson, personal communication, Oct. 14, 2004). Figure 5-2 shows that the distribution of the interviews by group closely matches the attendance distribution for the three meetings, measured in person-days.

![LLCF Meetings Attendance (Person-Days) vs Interviews](image)

Figure 5-2 Attendance and interview distribution by group

Excerpts from the interviews that were judged to fit the criteria of a critical incident or factor were transcribed and recorded along with the other questionnaire and interview data in a Microsoft Excel spreadsheet for analysis. A total of 423 critical incidents were
Themes, or categories of incidents, were developed inductively and iteratively to create a final set of 14 themes, broken down into strengths and weaknesses of the LLCF MAA process. A total of 253 critical incidents were assigned to strength themes and 201 incidents were assigned to weakness themes (note that a single critical incident may be assigned to multiple themes). The relative importance of themes is both a function of the number of respondents who mentioned the theme (by providing a critical incident that was judged to fit into the theme) and number of critical incidents assigned to the theme. Figure 5-3 and Figure 5-4 show the strength and weakness themes, respectively, in order of percentage of respondents who mentioned the theme. Figure 5-5 and Figure 5-6 show the same themes, in order of number of critical incidents assigned to each theme.

Respondents generally thought that the LLCF Five-year process was positive and were supportive of Ekati’s initiative to consult its stakeholders using MAA, as expressed by an IEMA participant: “Overall, I thought it was just a good process.”

![Figure 5-3 Strength themes sorted by percentage of respondents mentioning theme](image-url)
Ten of the themes (five strengths and five weaknesses) are considered to be major themes since they were mentioned by over 50% of the respondents.
The relative importance of themes according to the percentage of respondents who mentioned the theme and the number of critical incidents are positively correlated. Sorting the themes according to either criteria results in the same order for both strengths and weaknesses. This indicates that importance of individual themes is not tied to a small number of respondents mentioning a single theme many times, which would result in a relatively higher number of critical incidents but a relatively lower percentage of respondents mentioning the theme.

5.5.1 Background questions
The first section of the interview asked background questions that elaborated and expanded on the background information provided in the questionnaires. Respondents were asked to describe their overall impressions of their previous consultation experience with Ekati (see Section 5.4.1), given the options of “generally positive,” “mixed” or “generally negative.” Two respondents were not able to answer since the LLCF MAA process was their first experience, and the responses of the remaining 20 respondents are shown in Table 5-2 below. The responses have been quantified on a scale of 1 to 5 (1 = generally negative, 5 = generally positive) to allow comparison of group averages.
Table 5-2 Respondents' impressions of previous consultation experience with Ekati

<table>
<thead>
<tr>
<th></th>
<th>Regulators</th>
<th>Community</th>
<th>IEMA</th>
<th>Consultants</th>
<th>Ekati</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generally Positive</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Positive-Mixed</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Mixed</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Mixed-Negative</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Generally Negative</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total responses</td>
<td>8</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Average</td>
<td>4.13</td>
<td>2.67</td>
<td>3.00</td>
<td>3.00</td>
<td>2.80</td>
<td>3.35</td>
</tr>
</tbody>
</table>

Most respondents described their previous experience as mixed. Regulators tended to rate their experience substantially more positively than Ekati or community participants. The type of consultation or public participation venue and the subject matter of the process were important variables for the majority of respondents whose experience was mixed or partially mixed. For examples, public hearings and issues related to closure and reclamation were associated with negative experiences.

Leading up to and during the time of the LLCF MAA meetings most of the same organizations were involved in the process of renewing Ekati’s water license. These negotiations had been noted by a few respondents as being adversarial. However, this experience did not appear to have a significant effect on the LLCF MAA process, and was not brought up during the meetings.

5.5.2 Strength Themes

The strength themes, in order of importance, of learning, engagement, facilitation, representation of values, methodology, and venue and scheduling are described in this section. Illustrative quotes from interviews are shown for each theme. Selected quotes have been modified slightly (i.e., names have been removed) to protect the confidentiality of participants. The aspects of each theme (sub-themes) are presented in order of importance according to the number of critical incidents linked the particular aspect.

Learning

Respondents liked the opportunities for learning that the LLCF MAA process provided. This included learning about technical topics such as the biophysical processes that occur
in the Long Lake facility such as erosion and permafrost degradation, as well as the operational and management constraints of the facility.

The first meeting was the first time I really understood beaching and I really understood the very fine, the fluffy stuff as Andy calls it, as a management problem. I mean people may have told me about some of those things, [participant] in particular, but I hadn't appreciated exactly what was happening, so that was quite important. (IEMA participant)

I found Dr. Robertson's descriptions of how it would work, they stand out in my mind as, yeah, finally kind of getting that mental image of how it would work... I just remember coming away from his presentation with a good feel, like I understood. (Regulator)

Sometimes we don't think too much about the actual engineering part of it. We're quick to offer a solution, but to have the engineers there saying 'Look, well this would be great but we literally can't construct this, we can't do it. It's physically impossible' (Community participant)

Respondents praised the heavy use of graphics by the presenters in the meetings. Examples included large-scale plans and satellite images of the management options under consideration and PowerPoint presentations with many pictures and charts, with accompanying handouts.

The quality of the information presented was good, as was the resource binder. The maps and the PowerPoint presentations were very good. (IEMA participant)

Having those big posters up around the room with all the options. That was definitely good, rather than just having it on the PowerPoint, and being able to actually walk up to them and look at them. (Community participant)

... using the visuals, the maps that were on the wall, to explain to everybody what the different options are that the company's looking at, that was great. Having the handouts so people can follow along...nice to be able to refer to it in your own individual copy. I think they did a great job of that. (Regulator)

The afternoon tour of the LLCF during the first meeting at Ekati was also noted as helpful for understanding what the concepts described in the meeting room actually looked like in the field.
The most positive thing was the tour, to get out and see and understand all of the different options and actually see physically how it would work and where things were. I had seen Long Lake before that but it was interesting to hear so much about it then go out and actually see it, have a better understanding of its function. (Regulator)

Some of these [concepts/plans] aren't simple to grasp, and I didn't grasp the visuals necessarily until I was out on the site... some of the other concepts, like putting a road on the other side, when you see it on the land then you realize ‘Ah, okay, I understand’... So without the field trip part, even the presentation I don't think would have really, for me, being so unfamiliar with the site, would have really completely understood the context of everything...For me it as absolutely essential to have the two together. (Regulator)

The most positive thing is the fact that it happened on site and that we were able physically to get into the field and look at things happening in front of our own eyes and discuss in that environment, why we were seeing what we were seeing. (Consultant)

Respondents also appreciated the opportunity to learn from other participants besides the presenters who had considerable experience and knowledge.

I think we got a lot of really good involvement from people like [IEMA participant] and [Regulator] at that meeting. They have both been involved since the beginning of time with the project. They went through the environmental assessment in the mid nineties so they had a lot of knowledge to bring to the table and so I think their involvement was really helpful at assuring some of the other people who were newer and less familiar with the site, that we weren't pulling the wool over their eyes. (Ekati participant)

The evening [at the mine site], I guess, with the group, it did give me a chance then to touch base with some of the other people, just to double-check on how they were seeing, and following up some questions I knew I didn't quite understand. Having them rephrase it in their terminology was helpful. (Regulator)

Engagement
The way the LLCF MAA process engaged the active participation of stakeholders was affirmed by respondents. Participants were encouraged to ask questions and share their concerns and the opportunity for dialogue was viewed as a strength. The interactive
atmosphere helped to deepen participants’ understanding of the concepts presented. This included questions in the plenary as well as conversations during breaks.

The whole thing was open to dialogue. We were all able to say what we thought. (Regulator)

That [opportunity for dialogue] is not something that is unique to the MAA process, but it does provide the venue, it does provide the setting for it. You know, that you're open to these kinds of ideas, entertaining input. (Consultant)

The other part of being up there that I found really useful was of course the ability to chat with some of the people at lunch and over coffee, in a way that you maybe felt you didn't want to drag down the bigger group by asking what you thought might be dumb questions, but at least you could at least ask those questions on the side. And I found the consultants very open to that. (Regulator)

The early involvement of stakeholders in assessing various management options for the LLCF prior to the formal permitting application was welcomed. Stakeholder consultation traditionally takes place after an application, specifying single option selected by the company, is submitted to the MVLWB.

The idea of involving them in this MAA to me seemed like a great idea. Bringing them into the decision-making process early enough, give them a technical, educate them on how things were designed, how things have worked and how we want to make them work better and improve them... (Ekati participant)

I was impressed when I understood what BHP was doing and how proactive they were being and I thought it was a really good initiative to get everybody involved, all the stakeholders involved so early in the decision-making process. (Regulator)

Respondents appreciated the collaborative aspects of building an MAA ledger that directly incorporated the knowledge and concerns of all the participants to assist with the selection of a preferred option. This was contrasted against past consultation experiences that were more conflictual.

It just seemed positive. People were trying to work towards a solution, rather than some other setting that we've been in where you definitely
have that negative feeling, like there's a conflict there, that people are butting heads all the time. (Community participant)

When you open up to a public hearing or other public consultation where people are expressing just their opinions and it's not—I won't say factually based—but it's an interpretation of the facts. Then you don't get the closer consensus that we got in the MAA I think. This process took the options, it gave a ranking to them and it gave a weighting to them based on people's concerns and they could see 'Yes my concerns have been taken into account or they haven't been,' which is fine as well, and out of that here is what we came up with through our discussions. We were able to come up with something that is, I won't call it concrete, but it's a definite result, versus weighting people's opinions through a public hearing process. (Regulator)

Respondents liked the transparency of the MAA methodology for showing how different criteria and information contribute to the selection of a preferred option. They also liked the transparency of Ekati in making available to its stakeholders the information necessary to complete the MAA, contrasting this with previous approaches.

This is more than transparent, it's involving. (Consultant)

In the early years we would ask questions about how the tailings pond operates in detail, about the water chemistry and so on, and for many years, and this is very different from what happened in the last year, for many years we were told, I try to use some of the company terms, 'LLCF is a black box. You don't have to know what happens inside it. All you have to know is the water quality units released at 161630 at the outlet.' The agency found that to be very frustrating because it showed a lack of appreciation for the importance of understanding how things work to ensure that water quality criteria are not only being met now, but will continue to be met in the future. And so when the company started to be more responsive in carrying out studies about what is going on in the tailings pond and to talk about it openly as it did, we found that to be very encouraging. (IEMA participant)

I quite thought this would be a useful approach, because the only other alternative is the standard one whereby they make an application to the Water Board with their recommended option. And we don't see the consideration that has gone on behind the scenes to get to that option, and we don't have a transparent process to look at what the pluses and minuses are... The involvement of the stakeholders in getting to that end process could be a real strength of using the MAA. (Regulator)
Facilitation
Respondents commented that the facilitators and presenters were good at explaining concepts and directing the MAA process. The credibility and expertise of the presenters in the topics that were discussed, as well as their direct experience with Ekati, was considered very valuable. The credibility and relative independence of the presenters were considered to add to the credibility of the whole process for respondents.

What's lacking in the project is the corporate history as people have changed hands. So in this instance, you were dealing with the guys [consultants] who had reasons why things were where they were. From 1995, they had been working on the project... [Getting the historical background was important] because in order to provide a tour on what we are going to do to change the Long Lake Containment Facility, now you know why and how Long Lake Facility was designed originally. (IEMA participant)

To have the expertise there that Ekati did in Don Hayley and Mr. Robertson certainly went a long way in convincing people that Ekati had done their ground work and that they actually were presenting what they knew was correct... Especially the consulting engineers who had done the majority of the work, that's a big thing, to have the people who actually said 'I was there and did this.' (Regulator)

And I think we were effectively communicating what it was we were up to...I think Don and Andy are credible. A lot of our problems aren't that the concepts are hard. It's that nobody believes us no matter how we put it or what we say. (Ekati participant)

The company was relatively passive and so as a part of the process overall, that added great credibility to if for me... Having the company delegate to consultants to provide explanations, and the consultants have their own reputations to consider, that was very important. The source of this credibility was both their expertise and the fact that they were somewhat independent from the company. (IEMA participant)

The time given at the second and third meetings to review what had been discussed at the prior meetings was appreciated by respondents, especially for those who missed one of the earlier meetings and because of the time lags between meetings.

That was very helpful, the half-day review. If we are going to do that again, where we have the big time gaps in between, having that half day before, it might have seemed a bit excessive, but I think it was really
helpful, particularly for those who weren't at the first meeting... It was good for me too because, you know, you get working and you just don't have time to look at this stuff, and then when you are forced to be at the meeting and sit there, then it all starts coming back to you. (Community participant)

Especially as somebody who came into the series of meetings later, I liked how the consultants did spend the better part of the first morning going through what had been said at previous meetings and what the different options were. (Regulator)

Respondents appreciated how the facilitators responded to input and questions from participants. The also liked that the facilitators projected the MAA ledger onto a large screen so that their input was included and the ledger updated immediately before their eyes, making the process interactive.

Andy is an excellent facilitator and you never get the feeling that your question isn't being acknowledged or properly answered, or you know, that it's got full weight... (Consultant)

I like the way the consultants dealt with concerns and questions from the crowd... They tried hard to incorporate the values of the group, into creating the sub-accounts, and they added more sub-accounts. (IEMA participant)

Probably I would say one of the most powerful things that happened at the meeting was that when people had their concern, they went up as sub-accounts and we assessed them. That really demonstrates full, actual participation that your words are now sitting in that Multiple Accounts Analysis, so that was good. (Ekati participant)

Respondents mentioned that facilitators responded well to the time constraints of the process. In particular, they appreciated how Ekati staff and consultants worked into the evening at the third meeting so that the entire group of participants would be able to review the MAA ledger the next day and finish on time, as mentioned in Section 5.3.

The group that evening did a really good job getting a nice working model for us to see. So that was definitely a positive thing, bringing that to the table first thing the next morning. (Regulator)
Time constrained, but I think even that was handled well, because we, rather than trying to ram things through, went as far as we could go and then we [Ekati and consultants] completed it. And then we [full group] went back and reviewed it. (Consultant)

Respondents also said that the facilitators and presenters did a good job of explaining concepts in “plain language” that helped all the participants to understand, regardless of their technical background.

The consultants that they had there, like Andy Robertson, I found that for some pretty complicated technical stuff, he was really good at simplifying it and breaking it down so that it was easily understandable. And he didn't try to talk over everybody's head like some do, or forget that a lot of people talk in plain language. (Community participant)

I especially like Andy's presentation as far as ease of understanding. I think he does well in explaining concepts at a very basic level that everybody around the room can understand. (IEMA participant)

Representation of values
Respondents appreciated that stakeholder values were actively elicited in the MAA. Stakeholders liked that their interests were taken into consideration in the decision process and Ekati staff liked hearing what stakeholders were concerned about.

What I got out of it was, basically, what the stakeholders want. Taking away their concerns and then trying to incorporate those needs into the future reclamation plans that we need to develop. (Ekati participant)

And also we always appreciate having forums where there's all the different agencies sitting together in the same room and you can hear other people's opinions. (Community participant)

You get so many different interests coming together to come up with the best solution from everybody's perspective, I guess, is was it is designed to. I think that's a good way to capture the best of what everybody thinks in one decision. (Regulator)

It was also noted that not only were the values of participants incorporated into the MAA, but also that the various stakeholder groups were well represented at the meetings.
We had good people involved, we had an excellent representation from the stakeholder group. I think that was very appropriate. (Regulator)

The cross-section of people, the mix of people who attended I think was very good. Better representation from the stakeholders than I would have expected. (Consultant)

You've got all of the stakeholders there, all the disparate backgrounds, all your Aboriginal representatives, us and the company there and they're all talking about issues surrounding this one mine component. And so we are all learning a great wealth of knowledge from Don and Andy and the other consultants about what goes on in this LLCF. (IEMA participant)

Some respondents, including Ekati staff and stakeholders, liked that the MAA decision process took into account stakeholder values without trying come up with a unanimous consensus decision at the end of the process.

...it [MAA] allows you to put weighting on the things that are important. It's hard with 30 people to try and get consensus over one thing. You'll never get 100% consensus. So you have to have a process in which everybody can be heard, and you can take a look and sort of see what the key drivers are. (Ekati participant)

Methodology
Respondents noted several characteristics of the MAA methodology that they found to be helpful. Having a quantitative model at the conclusion of the process that allowed participants to ask “what if” questions and easily test the sensitivity of the preferred option to changes in value weighting reassured respondents that preferred option was robust.

The best thing of all, I found, was that we got to a point where we had a working model of it, where they could show how robust it was and demonstrate the sensitivity to changes in the weightings and the assignments. (Regulator)

It was really good this morning to have the opportunity to play with some of those numbers and still see how that one option sort of dominated all the rest, so I think that was a really positive thing too. (Community participant)
I thought that being able to play the 'what-if' scenarios with the rankings, and back various pieces out helped people understand the strength of the direction towards the option. (Ekati participant)

Respondents also said that the MAA helped them to think clearly about what was important in the decision. The MAA also broke the decision into smaller components (i.e., account and sub-accounts) and allowed them to see the effect of different options on each of the components.

I think breaking down all the issues that way helps. Here's all the things that we need to think about when we're trying to make decisions about things. I think that's really useful. Rather than just saying 'Well, we're concerned about the land and the water' What about the land, what about the water are you concerned about? How is this one going to be better than this one? What effect is this one going to have? (Community participant)

In this particular example, if you construed the structured process to be the identification of what you call the accounts and sub-accounts as things worthy of consideration and examining those, then I think the approach is very valuable... (IEMA participant)

Ekati staff also liked the flexibility of the MAA in accommodating both “technical types” like engineers and participants with other backgrounds that approach decisions in a different way.

I think that why it appeals maybe to a broad spectrum of people, because it appeals to the engineers because its mathematical and it's scientific and it's numerical, and you know, they're within a box, right, they can feel comfortable that way. And they can feel like they're going down through a linear process, clear decision points. And it makes other people who are less comfortable with decision-making more comfortable, because they are just small little decision points and it's not a 'yes or no,', it's not a 'black and white,', it's not 'I agree or I disagree.' It's I feel...I feel that this is this way, or I feel that this is this way. I think it gives everybody a little more sense of satisfaction. Like you say, it's a hybrid and it balances perspectives. (Ekati participant)

Venue and scheduling
Respondents commented that the venue (meeting room facilities) for the first and third meeting were good. Ekati staff liked having the first meeting at the mine site because it allowed the stakeholders to focus on the task at hand and not be distracted by their other responsibilities during the meetings. Several respondents mentioned that they liked the
long breaks (over a month) between meetings because they allowed them to think over what was presented and discussed at the meetings.

The other thing too is that you essentially had their undivided attention because they really had nowhere to go or anything else to do, so that is a good thing. (Ekati participant)

It was nice not to rush through to your decision-making at the end, and the ability to have a few weeks before the second meeting was coming up, so that way one can have chats with other people, and sort of say ‘This one struck me this way. What did you think about it.’ (Regulator)

5.5.3 Weakness Themes

The weakness themes, in order of importance, are unequal and insufficient participation, trust and transparency, time constraints and time management, better explanation of process, continuity and review, venue and scheduling, methodology and representation. The weakness themes are presented in an identical format as the strength themes in Section 5.5.2.

Unequal and insufficient participation

Although the respondents acknowledged that there were opportunities for participation, they didn’t think there was enough participation and that some people participated actively and vocally while others were more passive. Respondents suggested that having the discussion in a large plenary group (between 20 and 35 people) made it intimidating for some participants to ask questions or share their concerns, and proposed that breaking out into smaller groups could have made these participants more comfortable and likely to participate actively.

...maybe this should have been done in small groups, rather than just one big group. Sometimes - and it's true - I think sometimes people are a bit reluctant to speak when they are in larger groups. (Community participant)

Until we got to sort of start to talk about the MAA, we didn't really get a lot of participation. So it wasn't overly participatory. You kind of have to get people to understand but I think by them not participating they wouldn't understand... I would say for this particular one you probably
would have been better off to go into little groups and talk about, maybe have groups with each of the different options and discuss that and get some feedback and talk about it. (Ekati participant)

Respondents also remarked that having the presenters, who are top experts in their respective fields, lead the discussion and suggest numbers for ranking the options made it difficult for participants to give suggestions, for fear of contradicting what the experts had just said.

I thought maybe it would be structured differently so that people would have more of a chance at dialoguing. As it was, I felt that the consultants really did the discussion. It was kind of them going up and saying ‘Okay, this is what we think, where the numbers should be, and everyone else, what do you think?’ ‘Oh year, it sounds pretty good’ (Regulator)

I would say one of the things we didn't do as well as we could have was that a lot of the, where we were looking at the sub-components there, the expert would talk to it. And then realistically, who was to refute that, when realistically you would be much better to have a lay-person talk to it, and say ‘I think this would be the best’ and then that will generate the discussion. When the expert talked to it, you were pretty much done. (Ekati participant)

Despite efforts to make the technical content easy to understand, the presentations and discussions were still considered to be too technical for some participants. This was regarded as a major challenge for this type of broad multi-stakeholder consultation process.

We need to think more about how to tailor the MAA more so that it is more accessible to people with less education, while still being useful to the technical sorts. And I think part of that is just the level of language that is used, that you can say the same things but you have to work on the simplicity. (Ekati participant)

I could certainly look around the room and see that some of this was much too technical for people. I noticed some people were showing some disinterest in some of the topics. (Regulator)
Respondents noted that there was unequal participation, with some participants dominating the discussions and others not speaking. They would have liked to hear more from the Aboriginal community participants, in particular.

I think that still, even at that meeting, though, you could see the focus of the discussion was probably more related to the monitoring agency... It seemed like we were spending a lot of time talking about their issues, and again it may not have reflected the concerns that everybody would have. (Regulator)

The second meeting did not elicit, with some exceptions, a lot of input from stakeholders. There was a lot of people who attended the meeting who said very little. There was or two of the stakeholders, external stakeholders who were quite dominant. So it certainly wasn't a uniform contribution from the stakeholders (Consultant)

I think there were always people who didn't ask many questions. And that's sometimes difficult, to draw people out and to make sure you get everybody talking. (Ekati participant)

A number of respondents mentioned that they would have preferred for the facilitator to have been more directive in cutting short some of the more vocal participants, particularly those who went “on tangents” (off topic), to allow more space for others to contribute to the discussions.

I found that [the facilitator/speaker] would get involved in the conversation, then, like I said, an hour would go by, and all of a sudden we've spent time talking about, you know, someone else's concerns, and meanwhile, we're falling further and further behind in our schedule. (Community participant)

I think some of the people tended to get off on long tangents. Perhaps one of Andy's weakness is not stopping things ‘Okay we've heard you, don't keep talking about it for the next half hour.’ I think Andy's a very, very patient man. (Ekati participant)

Trust and transparency

There were some concerns related to the transparency of the LLCF five-year review process and Ekati’s motives for undertaking the MAA. These concerns were generally
not expressed as outright criticisms, but as suspicions or unease with certain aspects of the process. The fact that participants were asked to assess a fixed set of options (for the management of the LLCF) without having an opportunity to modify them led some respondents to suspect that the MAA was set up to have one of the predetermined options come out as a “winner.”

Within a few hours of talking about alternatives and so on, it became very clear to me that for both the consultants and for the company alternative three, the one ultimately chosen, was the preferred alternative and there was some tendency to colour their responses to questions to promote that conclusion. (IEMA participant)

The session that I was at was very well planned, in the sense that the people doing the work had really worked through it and probably a thousand more options before trying to hone in on what they thought were the best... Some of the people I know who attended were very worried that they were being manipulated. (Regulator)

In the back of my mind, it is almost as if the company has presented some options and gone through this process to get everybody to agree with some of the things that they wanted. And so that's just like a background thought that you have. (Regulator)

Other respondents noted that having a pre-determined set of options limited the ability of the group to create new and perhaps better options.

There was not really time set aside to say, if you wanted to, in all these options that we have up here, is there anything that you see in this one here that you might want to put into this, to work some combinations? (Ekati participant)

We weren't involved with developing these options to start with. We were given these options to deal with... For instance, the option in 1b, the option of putting a drainage channel down the east side of Cell B would improve 1b immensely in terms of reclamation. That wasn't one of the options that was on the table. (Consultant)

Respondents generally thought that the MAA process was productive and worthwhile, but had concerns about whether its outcome would really influence Ekati’s ultimate
decision or whether it would be portrayed as a replacement for regular consultation during the permit application process.

I thought it was a useful exercise, I just hope that BHP is really committed to at least considering what the community recommends, in terms of options, and not just doing this, I am not sure what you would call it, a PR exercise. You know ‘Oh yes, we brought everyone in and everyone knew what was going on, and everyone agreed, that this is what they recommended.’. (Community participant)

I don't know if you have heard this from other government-type people, but the worry, I think, is that BHP's consultation, the results of their consultation will be brought forward as a ‘Well, everyone decided this is what should happen,’ whereas there are channels to go through to really confirm that... Just so people don't get confused between a government consultation around a change to the facility... (Regulator)

Some of these concerns are linked in part to different conceptions on the part of Ekati and its stakeholders about what constitutes consultation. Ekati’s operational definition of consultation seems to be broader and includes formal and informal venues, from information sharing and site tours to deliberative processes such as MAA. Their stakeholders’ understanding of consultation is limited to formal venues that directly and substantively involve them in providing input, as well as listening to information provided by the company.

I know that I had gone to some meetings at Ekati...I know that Ekati portrayed it as consultation, that they had consulted us, and specifically named our department. And there's a lot of different definitions of what consultation is, and especially concerning the requirements for Aboriginal consultation... I am not sure that I necessarily agree with their terms. I can see more of it through this MAA approach, that may have been more consultation than in the past...I think there has been [in the past] information transfer, that's really what it was, but to me I think Ekati considers that consultation. (Regulator)

There's so many things that, you know, constitute consultation, like picking up the phone is, you know, a great deal of it is consultation...I think consultation is multi-faceted. (Ekati participant)
There were also a few concerns raised that some aspects of the process could have been more transparent, such as being more explicit in telling participants that they could modify the electronic versions of the MAA ledger that were to be sent out following the last meeting and send them back to Ekati for consideration.

They didn't announce that [sending in MAA ledgers electronically] to the larger group at the end, which surprises me. And a more cynical man than I might say that, well they are hoping not to receive anything. So for transparency, that's not a good idea to leave it as they did. (IEMA participant)

Time constraints and time management
Respondents said that time during the meetings often seemed rushed and that more time was needed, particularly for the third meeting.

On the negative side I think we kind of ran out of time so we probably could have used another day to do the job if we wanted to the job in a more thorough manner. (Consultant)

If you really wanted to do this really well - definitely more time. A day and a half was not enough, not by far. Some of these things, you really need to think about. (Community participant)

Some respondents remarked that they were sometimes hesitant to ask questions or participate in discussions because they knew the meeting was behind schedule.

The whole thing was open to dialogue. We we're all able to say what we thought. But there was always that thought in my mind ‘Well I am not going to raise this because we are approaching the end of our day or we are running out of time or we don't want to go off on a tangent.’ So it was the time crunch. (Regulator)

Suggestions from respondents on making efficient use of the available time included more control of the discussion by the facilitator, as mentioned in the “Unequal and insufficient participation” theme above, and having Ekati and its consultants complete the economic and operations accounts outside the plenary meetings.

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We were allowed to get off schedule. I think overall, though, we did get enough comments and I think we still did accomplish. But the way they had to make it up was they had to spend the evening and go overtime, and then spend a lot of time in the evening to address those deficiencies in time. (Regulator)

As far as the stakeholders’ concerns, I think that there were some of the categories or accounts which really didn’t necessarily apply to people in the room. Sometimes it seemed like they were issues that were really best dealt with between BHP and their consultants and there wasn’t a lot of input that we could have given at that stage. (Regulator)

Better explanation of process
Respondents thought that the objectives and steps of the MAA should have been explained earlier and more comprehensively. Some respondents suggested that doing a few simple examples of scaling and weighting MAA sub-accounts would have helped in this regard.

Coming out of that [second] meeting, I guess, I was a little bit muddy about what they were expecting of us coming into the third meeting. (IEMA participant)

We had it over three different meetings and we knew in our minds what we were doing and what information was going to come up in each of those three meetings, but I didn’t necessarily think that we conveyed that to the stakeholders… We had a good grasp on how these meetings were going to lay out, evolve. They didn’t and we didn’t really give them a good overview of [the MAA process]. (Ekati participant)

And I had trouble getting my head around how actually this would work. You know, it might have worked better if one actually engaged people in an example, saying ‘Look, this is where we want to head, this is what we want you guys to do and so that you better understand what we expect from you.’ (Consultant)

Apart from the expectations and objectives of the LLCF MAA process itself, there was also a lack of clarity regarding how this process would fit into the eventual permit application to the MVLWB.
The only thing that I wasn't sure of was again, where was it going to lead to. By the end of it, I still didn't quite have the concept of 'Is there a decision being made that's going as a consensus to the Land and Water Board?' or is it just really the understanding, so that when people are trying to put their positions together for the Land and Water Board? (Regulator)

Continuity and review
Respondents remarked that the attendance at each meeting varied and that it would have been ideal to have the same group of people attend all three meetings since each meeting built on the presentations and discussions of the previous meeting. They also acknowledged that this is very difficult due to travel arrangements, and the challenge of finding meeting times that work for a large number of busy people with many commitments.

I think that's pretty important to have the same people [come to all the meetings], because if not I think you're losing a little bit, because people haven't heard the same things other people have heard and they are coming in later in the process. (Community participant)

The thing that kind of frustrated me, and whether it's a weakness or not, is the fact that we had changing people at all of these meetings... You want to get the same people all the time yet you know it's impossible with thirty-odd people, trying to get them all booked together for the same couple of days. (Ekati participant)

Although they acknowledged that it was necessary to accommodate participants who missed earlier meetings, some respondents thought that the lack of continuity of participants forced the presenters to spend too much time reviewing content from the earlier meetings.

We had new people brought into the process that hadn't attended the first meeting so that, I guess we certainly had some expectations that that would happen, that would be kind of a negative because we were constantly having to backtrack. Maybe a little bit too much backtracking was required to bring these people up to speed. (Consultant)
I found it to be a bit of a rehash... There were some new people there so I think they covered some of the ground a little more extensively that we covered already in the first meeting. (Regulator)

**Venue and scheduling**

Some of the meeting facilities were noted as being less than ideal, although respondents stated that they did not consider these to be major drawbacks. In particular, the meeting on the first day of the first meeting in the gymnasium had poor acoustics and lighting, and facilities for the second meeting were crowded.

There might have been a bit of an underestimation of the interest in this and the facilities, the Chateau, were probably not sufficient for the number of people we had. (Regulator)

Respondents also commented that although the site visit was helpful, it would have been more useful if it had been done before earlier in the season when it was warmer and the features of the facility were not obscured by snow.

The negative part of that was that the timing of the meeting from a climatic standpoint wasn't very good. So it was cold and frozen. To be more effective, the scheduling and timing of that meeting on site should have been before freeze-up. (Consultant)

Respondents also commented on the time between meetings. Although some liked having long periods between the meetings as mentioned in Section 5.5.2, others viewed the lags between meetings as an inconvenience because the prior meetings were not fresh in their minds.

That was probably one of the negative aspects of this whole process: the time gaps between the meetings. I know it's hard. You've got lots of people with different commitments, you've got holidays in there and all this kind of stuff, but it was very difficult, I found, to get back into the swing of things. (Community participant)

**Methodology**
Respondents expressed concerns about some characteristics of the MAA methodology. In particular, the scaling and weighting (quantification) steps were seen as problematic. This included the difficulty of ranking one potential impact on nature against another, and the perception that people have difficulty understanding the process and assigning scores that accurately reflect their values.

The Accounts Analysis, in general for me, and I think for most First Nations people, it was really hard to - I mean, it was easy to break down the issues as to things that you were concerned about - but when it came down to ranking them, in terms of one that's more important than the other. You know, do rank water as more important than air quality? That was really, really difficult, because when you talk to community people or elders, everything's connected, everything goes together... (Community participant)

If the purpose of Multiple Accounts Analysis is really to force decision-makers, in this case, multi-stakeholder decision-makers, to think about and to identify the various kinds of consequences of the different alternative, then it is of immense value and should properly be replicated. If it is of value because, having identified these various consequences, one then has to find some way of comparing apples and oranges, and the essence of it is the scoring and weighting, then I find that to be of some value, but relatively limited value. And the reason for that is that the ability to score abstractly and correctly is relatively rare in most human beings. (IEMA participant)

Other respondents' concerns were related less to inherent challenges of quantification and more to how MAA methodology was applied in the meetings. These included using a wider range of ranking numbers than necessary (e.g., 1 to 5 instead of 1 to 9), not recording the rationales behind rankings and showing an example of intra-account ranking that used an inconsistent interval scale.

I think this one [MAA] was very complicated. We could have simplified it a lot, I think, and maybe that would have made it easier for people to understand. (Community participant)

One of the weaknesses of the MAA process is there is no way to record your reasonings behind your choices, behind giving something a five as
opposed to a seven, or whatever. I hope BHP does it. I hope we get a list of their reasons [for rankings]. (Community participant)

Representation
Respondents commented certain stakeholders, in particular Aboriginal communities, and particular areas of expertise were not represented at some of meetings.

Again, I think it would have been nice to have more Aboriginal people, more community representatives there. (Community participant)

I really, really, really would have liked some of our other people to have participated because I really wanted to hear the wildlife stance, and I think by them not participating, it was harmful to the bigger group. (Regulator)

I was a little bit disappointed at some of the attendance because there were definitely some key people that weren't there that had been at the first two meetings. (Ekati participant)

Others noted that although there had been opportunities for discussion, they still didn’t know where some of the groups stood on the issues of managing the LLCF and that they didn’t feel like they could say that they could make a final judgment without reporting back to their constituencies.

I am sort of reluctant, okay I went to the meetings, but I don't say my opinion as representing the community's. I have my opinion, I might bring that back to the community but it's up to them what they decide. (Community participant)

5.5.4 Other themes

There were several other themes that either did not meet the criteria of being mentioned by at least 25% of the respondents (i.e., minor themes) or were common observations rather than identifiable strengths or weaknesses.

Information gaps were raised as a weakness, both in the context of missing the results of studies pertaining specifically to the LLCF (e.g., water chemistry), but also relating to the operation of the mine itself. One community participant felt strongly that Ekati should be
taking a much more precautionary approach: “For the way they’re handling things, they
should have more research on it before they even consider going ahead with it.”

The effort involved in putting together a deliberative multi-stakeholder process such as
the LLCF 5-Year review was another theme. It was noted that the MAA was resource-
intensive, requiring substantial time commitments from Ekati staff and stakeholders, in
addition to the expense of bringing all the participants together incurred by Ekati.
Respondents thought that it was worth the effort, but some remarked that not all decisions
merit this level of deliberation and that this type of process can’t be done with partial
effort, but rather needs a commitment to do it properly.

I guess that I have to look at the overall benefits of doing it [the MAA],
the time and cost involved and ask myself... You would have to justify the
true value you're going to get back from it. I think in this case with Ekati
the value was there. I think a person has to be fairly objective in terms of
whether it's the right process for the objectives that are desired.
(Consultant)

Another theme was that the MAA process and its outcome were not yet decided.
Judgments on the cost-effectiveness of the LLCF MAA process from Ekati’s perspective,
and the level of satisfaction with its outcome from the perspective of the stakeholders,
were considered to be premature. Some respondents wanted to go through their own
electronic copy of the MAA ledger that Ekati was to send out and return it with their own
numbers, and considered the process unfinished until this was done: “The MAA isn't over
until, I believe, they receive the participants' final go at 'Here are our preferred
rankings.'” (IEMA participant)

Both Ekati staff and stakeholder respondents said that they would only be comfortable
making a final judgment on the merits of the MAA after the chosen option for the LLCF
management plan had been successfully permitted by the MVLWB. Stakeholders want to
see if Ekati goes ahead with the widely-supported preferred option of the MAA in its
application, or chooses a different option altogether without stakeholder input. Ekati staff
want to see if the permitting process proceeds smoothly and rapidly because they involved stakeholders early in the decision-making process.

So if the company doesn't use these results, there will probably be a lot of complaints among the stakeholders that attended, that their time wasn't used properly. (IEMA participant)

It was very time-consuming. I think it was beneficial. I think it was time well spent and I think it will be very helpful in getting this approved in the end. (Ekati participant)

5.5.5 Specific questions
Following the CIT section of the interview respondents were asked several open-ended questions on specific topics.

Question 7 asked respondents who had missed one or more meetings the reasons for their absence. The reasons given included being on vacation, having other work-related commitments, travel delays due to weather or being asked to replace organization representatives from prior meetings who could no longer attend. No respondent indicated that dissatisfaction with an earlier meeting influence his or her decision to not attend. In some cases, I explicitly probed initial responses to verify that dissatisfaction was not the cause of absenteeism.

Question 8 asked "What are some ways that the MAA process could be improved?" The majority of the suggested improvements from respondents were given in the CIT section of the interviews, without prompting, in response to the question about weaknesses of the LLCF MAA process. The suggestions for improving the MAA process are captured in the weakness themes in Section 5.5.3. Frequent suggestions included breaking out into smaller groups for discussion, allowing more time and explaining the MAA rating procedure more clearly before starting to assign numbers (i.e., scaling).

Question 9 asked "Apart from improving the MAA process, can you suggest any different consultation methods that would better than MAA for consultation activities like the LLCF consultation?" No respondents suggested a better alternative. One respondent
with extensive public participation experience said that other processes could be equally effective if they allow for the same identification and consideration of the importance of key issues (regardless of whether they involved a quantitative comparison of options or not), but did not name one specifically. Several other respondents responded initially by saying that they could think of a better alternative, but when probed acknowledged that their ideas represented improvements how MAA methodology was applied for the LLCF review process, rather than a distinct methodology or process. For example, these respondents described a process in which participants are involved in creating the options, or scaling and weighting of the options is done in small groups, then reported back to other participants in a plenary session.

5.5.6 Summary questions
The same summary questions on satisfaction with MAA outcome and recommending future use of MAA in the questionnaire were asked again at the end of the interview. Outcome satisfaction increased negligibly, from 3.79 to 3.80 and recommending future use increased by 7% from 4.00 to 4.27 from questionnaire to interview.

Note that some respondents who returned a questionnaire did not participate in an interview, and vice versa. The results for only the 15 respondents who completed both a questionnaire and participated in an interview are shown in Figure 5-7. Outcome satisfaction for this subset of respondents increased by 3% and recommending future use increased by 10%. These results indicate that talking about and reflecting back on their experience caused respondents to look more favourably on the LLCF MAA process. This may be due to the fact that the questionnaire was administered at the end of the very busy last half-day, after the meeting had gone half an hour over time. Respondents were likely too rushed to feel comfortable making stronger statements about the process and hence tended more towards “undecided” than in the interviews.
Figure 5-7 Comparison of Summary Questions From Questionnaire and Interview

The summary questions data for all 26 respondents are shown in Table 5-3 and Table 5-4 below. The data is from the interviews, with the exception of questionnaire data from the four respondents who completed the questionnaire but did not participate in an interview. Group averages to both summary questions are also shown graphically in Figure 5-8 and Figure 5-9.

Table 5-3 Satisfaction with outcome of MAA by group

<table>
<thead>
<tr>
<th></th>
<th>Regulators</th>
<th>Community</th>
<th>IEMA</th>
<th>Consultants</th>
<th>Ekati</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Agree</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Undecided</td>
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<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total responses</strong></td>
<td><strong>8</strong></td>
<td><strong>4</strong></td>
<td><strong>4</strong></td>
<td><strong>3</strong></td>
<td><strong>5</strong></td>
<td><strong>24</strong></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>3.63</strong></td>
<td><strong>2.50</strong></td>
<td><strong>3.75</strong></td>
<td><strong>4.33</strong></td>
<td><strong>4.60</strong></td>
<td><strong>3.75</strong></td>
</tr>
</tbody>
</table>
Table 5-3 shows that 71% of respondents rated their satisfaction with the outcome of the MAA as agree or strongly agree. Community respondents' satisfaction is substantially lower than the average, and Ekati and consultants' satisfaction is higher than the average.

![Satisfied with outcome of MAA](image)

**Figure 5-8** Satisfaction with MAA outcome by group

Table 5-4 shows that 85% of respondents agreed or strongly agreed with recommending the use of MAA in future consultation processes. The distribution of the various groups' ratings about the overall mean is similar to the previous question.

Table 5-4 Recommending use of MAA in future consultation by group

<table>
<thead>
<tr>
<th></th>
<th>Regulators</th>
<th>Community</th>
<th>IEMA</th>
<th>Consultants</th>
<th>Ekati</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Agree</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Undecided</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total responses</strong></td>
<td><strong>10</strong></td>
<td><strong>4</strong></td>
<td><strong>4</strong></td>
<td><strong>3</strong></td>
<td><strong>5</strong></td>
<td><strong>26</strong></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>4.10</strong></td>
<td><strong>3.25</strong></td>
<td><strong>4.50</strong></td>
<td><strong>4.67</strong></td>
<td><strong>4.80</strong></td>
<td><strong>4.23</strong></td>
</tr>
</tbody>
</table>

Table 5-4 shows that 85% of respondents agreed or strongly agreed with recommending the use of MAA in future consultation processes. The distribution of the various groups' ratings about the overall mean is similar to the previous question.

132
Based on my observation of the meetings, satisfaction with the outcome and willingness to recommend future use of MAA (from the above data) is correlated with how actively and vocally each group participated in the meetings. Impressions of previous consultation experience with Ekati (Table 5-2) are not strongly correlated to support for the MAA outcome, apart from distinctly more negative assessments from the community group, as shown in Table 5-5 below.

Table 5-5 Comparison of past experience of consultation with support for MAA outcome

<table>
<thead>
<tr>
<th>Average score</th>
<th>Regulators</th>
<th>Community</th>
<th>IEMA</th>
<th>Consultants</th>
<th>Ekati</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Past experience with consultation</td>
<td>4.13</td>
<td>2.67</td>
<td>3.00</td>
<td>3.00</td>
<td>2.80</td>
<td>3.35</td>
</tr>
<tr>
<td>Satisfaction with come of MAA</td>
<td>3.63</td>
<td>2.50</td>
<td>3.75</td>
<td>4.33</td>
<td>4.60</td>
<td>3.75</td>
</tr>
</tbody>
</table>
Both questions summarized in the above table are on a scale of 1 to 5 (negative to positive), albeit with slightly different verbal descriptors (i.e., strongly disagree to strongly agree, generally negative to generally positive).

5.6 Summary of results

A total of 26 respondents participated in the study. Overall respondents had a positive assessment of the LLCF MAA meetings. Themes from the interviews were divided into strength and weakness themes. The most important strength themes were learning, engagement and facilitation. The most important weakness themes were unequal and insufficient participation, trust and transparency, and time constraints and time management. The majority of respondents agreed or strongly agreed with the following statements:

- "I am satisfied with the outcome of the MAA." (71% of respondents, average score 3.75 out of 5); and
- "I would recommend the use of MAA in future consultation processes." (85% of respondents, average score 4.23 out of 5).
Chapter 6 Discussion

This research question guiding this thesis is: “Are Structured Decision Processes an effective methodology for involving stakeholders in consultative decision-making in the mining industry?” The first section of this chapter examines this broad question within the narrower scope of the case study by asking the practical questions: “Did the use of MAA in the LLCF consultation meetings ‘work?’ Was it a positive experience for the range of participants?” The second section looks in more detail at the specific aspects of the process that respondents did or did not like, and draws out from these recommendations on: 1) improving MAA and consultation in general at the Ekati Diamond Mine, 2) improving the MAA methodology itself, and 3) applying SDPs such as MAA at other mines. The third section compares the themes drawn from the interviews with the public participation evaluation criteria from the literature. Finally, suggestions for future research are proposed and a summary of the thesis is given.

6.1 Ekati case study

Based on the questionnaire and interview data collected and my observations of the LLCF consultation process, SDPs such as MAA are an effective means of involving stakeholders in consultative decision-making for the Ekati Diamond Mine. As mentioned in Section 5.5.4, how the permitting process proceeds will have an important influence on participants’ final perceptions on whether the MAA process was worthwhile. Respondents’ feedback on the LLCF MAA process was generally positive and there was strong recommendation for its future application. However, all respondents also noted areas for improvement, many of which I had also noticed during my observation of the meetings (and are discussed in Section 6.2); this is not surprising since this application of MAA was novel for the majority of participants, and even for the facilitating consultants in certain respects (see Section 2.3.6). It was significant that not a single respondent was able to think of an alternative methodology that would have been preferable for this particular context and decision, even though most respondents had experience with numerous other consultation methods. While this is by no means an absolute seal of approval, it does indicate that there is value in putting effort towards improving the application of MAA.
As noted in Section 3.3.2, the LLCF Five-Year Review Process was not particularly controversial because it was a proactive measure to improve the operation of a facility that already had a good track record. As such it was a good opportunity for the company and its stakeholders to try a novel approach to consultation in a lower-risk environment.

6.2 **Strengths and areas for improvement**

This section describes the identified strengths and proposes improvements to mitigate the perceived weaknesses of MAA, based on my direct observations and my interpretation of the results reported in the previous chapter. It is grounded in the case study experience, but seeks to relate this to the literature review, and make observations about possible opportunities for further application of SDPs in the mining industry.

6.2.1 **Ekati context**

Many of the strengths identified also have corresponding areas for improvement, as expressed in the weakness themes. Although many of the themes discussed could apply to a wide range of consultation methods, how the distinct characteristics of MAA contributed to the themes is emphasized.

The opportunity that the LLCF MAA provided for learning about the LLCF was a key strength of the process. Having presenters with considerable experience in tailings management, and long-term experience with the LLCF itself, was a definite asset. It was also important that the presenters not only possessed useful knowledge, but were also able communicate this to a diverse audience, skillfully using analogies and graphical representations to convey the salient concepts. The presence of stakeholders with considerable technical expertise also contributed to learning, because their independence from the company assured less-experienced stakeholders that the material presented was balanced and accurate. Review and repetition of lessons learned and options at the later meetings reinforced key concepts, and facilitated the participation of those who had missed earlier meetings. Any good consultation process should foster learning, but the fact that the MAA entailed application of newly gained knowledge may have enhanced
learning compared to more passive consultation methods. There is possibly a sense of accountability in learning, both on the part of the company and its consultants, to ensure that stakeholders are able to make a meaningful contribution to the MAA ledger and are not frustrated by the process, and on the part of stakeholders who are expected to contribute their own knowledge and values to the decision at hand.

Involving and engaging stakeholders earlier than usual (i.e., well before the permitting application) and using a transparent decision framework were also key strengths. The collaborative atmosphere was contrasted against some respondents’ previous experiences with conflictual public hearings, for example. There were many opportunities to have one’s values reflected in the accounts chosen and the weighting process, and a broad enough representation of stakeholders to allow a fair balance of interests. Presenters affirmed questions from participants and created a positive atmosphere for dialogue.

As much as respondents appreciated the opportunities for participation, they also said that the participation was dominated by a small number of people and that some aspects of the meeting format worked against fostering broad involvement. Respondents from all groups expressed a desire for more Aboriginal participation, both in terms of greater representation of the Aboriginal communities at the meetings, as well as hearing more about interests and concerns from Aboriginal participants who attended the meetings. The more vocal participants were mostly technical experts, who asked technical questions and were confident enough to keep pressing if they were not satisfied with the responses they received from the presenters or Ekati staff. This occasionally evolved into effectively two-way conversations that were exclusive because they involved subject matter beyond the knowledge level of most participants, although I do not think this was anybody’s intention. When presenters are asked specific, pertinent technical questions, they have little other choice but to respond with technical explanations, so this scenario is difficult to avoid. Not only are these conversations difficult to “jump into,” they also may cause other participants to be apprehensive in subsequent discussions for fear of appearing “ignorant.” Participants commented on only one vocal participant who asked questions that were markedly off-topic and was perceived by some to be motivated by a need to
appear important rather than a sincere desire to understand or help others understand the topic of discussion.

There are a number of possible techniques for encouraging more equal and active participation. Within the larger plenary group, more intervention from facilitators could help draw out some of the quieter participants. This would occasionally require the facilitators to cut short more vocal participants, which may seem counter-intuitive since a central objective of MAA is fostering dialogue. However, this is necessary and can be done sensitively, particularly if the facilitator gives notice to participants at the outset that he or she will do this to ensure everyone gets a chance to be heard. Facilitators can also have a flip chart nearby to use as a “parking lot” to jot down ideas that merit discussion but are either off-topic or only of interest to a small fraction of the group. This enables participants to see that their idea is not dismissed, but rather “parked” until a more appropriate time such as during a coffee break. Several respondents noted that the needs of individual participants to be heard have to be balanced with respecting the time of all the other participants.

Another approach is to conduct more of the MAA in breakout groups rather than entirely in plenary. The different dynamics of smaller groups would encourage more discussion and involvement of quieter participants. Breakout groups could be used at different stages (e.g., explaining lessons learned, brainstorming accounts, scaling the options), reporting back in plenary if necessary. For examples, groups of five to seven people could be led by different presenters or Ekati staff who would speak to their particular area of expertise, with groups rotating through stations. This strategy was used effectively for a three-day intensive policy-oriented mining SDP in Malaysia (Gregory & Keeney, 1994). Another “breakout” strategy would involve a separate half-day meeting at the start of the process specifically for Aboriginal community participants and others with minimal direct experience with the topic (e.g., the LLCF). This would be specifically tailored for this audience and would be designed to give them a head start before commencing the full group meetings. More experienced stakeholders could be invited to participate in teaching role, rather than pursuing the mandate of their organizations as they would in the
regular meetings. There are many options for the format of breakout groups, but I believe that used in conjunction with plenary sessions they would enhance attentiveness by breaking up long presentations and fostering more dialogue.

Participation was also limited by time constraints, particularly in the third meeting. Some respondents expressed that because the meeting was behind schedule they did not want to hold up the whole group with their questions or input. One apparent remedy is adding another meeting or making each meeting longer. However, the given the challenges of scheduling and getting the same busy people to attend all of the meetings, this would not appear to be desirable for most participants, and especially not for Ekati, which has to organize and fund each meeting. Some of those who attended all the meetings were frustrated by the lack of continuity of participants, which forced the facilitators to spend a significant amount of time reviewing material presented at previous meetings. Despite this frustration, the participants could understand that the reasons for absenteeism were valid and largely unavoidable.

A more promising alternative than adding more meetings is making more efficient use of the same allotted meeting time. Respondents acknowledged the tension between reviewing enough to allow participation of those who missed and progressing through the agenda. I cannot think of a feasible way of ensuring continuity of participants, so finding ways of getting people up to speed outside of allotted meeting time is important.

Producing more detailed handouts to be distributed in advance of meetings is an option, although prepared plain language summaries requires a lot of effort and skills that are not common among engineers and scientists. The facilitator could strongly emphasize at the start of the process that the meeting content is cumulative, and attempt to shift more of the responsibility of briefing and review onto organizations that are unable to send consistent representatives. For example, the facilitator could explain that only a small amount of time will be allotted for review of other meetings so organizations should give a detailed briefing to representatives joining the process in later meetings.
One respondent suggested that Ekati should do the scaling of accounts that are not salient to stakeholders outside the meetings and simply present the results for discussion. In the LLCF MAA process, this would include only the Operations and Project Economics accounts, which do not lend themselves to stakeholder involvement because the relevant knowledge is almost entirely in the domain of the company, and because they are only of interest to stakeholders inasmuch as they influence other accounts (e.g., Environmental and Closure). Participants would still be involved in the weighting of these accounts relative to the others.

Another approach to minimizing time pressures in meetings is to develop parts of the MAA ledger outside the meetings. This could be done after the initial information transfer phase (i.e., between the first and second meetings for the LLCF MAA process). Participant interests and values would be elicited through individual or small group phone or personal interviews to develop the accounts and sub-accounts. The facilitator/interviewer would combine the accounts gathered into a preliminary comprehensive MAA ledger that would be reviewed in the next meeting. Individual brainstorming of objectives followed by group discussion has been shown to be effective for developing a comprehensive set of decision criteria (Hill, 1982) and this technique has been employed by numerous prominent decision analysts ((Gregory & Keeney, 1994; Keeney & McDaniels, 1999; McDaniels, 2000; von Winterfeldt, 1992)). Respondents in a study by Hobbs and Horn (1997) felt strongly that individual interviews with the decision analysis facilitator were a critical complement to group discussion sessions. This approach would ensure that all participants (including those reluctant to speak out at meetings) would contribute their values, and would put less demand on precious meeting time.

One aspect of the process that would have benefited from more time in the meetings is explanation of the MAA method, and how the LLCF MAA process fits into the ultimate permitting of a plan. Even though the MAA process was explained at each meeting, participants were not totally clear on the desired outcome of the MAA process or what was expected of them. Using illustrative examples of simple MAAs and explicitly stating
how stakeholder input would be incorporated (e.g., suggesting sub-accounts, scaling and weighting), were suggestions made by respondents. I would add to this more explanation about how decision analysis aids decision making through decomposition and minimizing the effects of heuristics and biases, for example. A simple presentation would help to show that selecting a SDP such as MAA is not an arbitrary choice on the part of Ekati, but rather a means to making a better decision for all the parties involved.

A particularly interesting comment from an IEMA participant in one of the earlier interviews was that because the process had not been fully explained, he had feared that Ekati was going to push for a unanimous consensus by the end of the third meeting. I had wondered if stakeholders might have preferred a consensus process, but over the course of the remaining interviews a number of other stakeholders and Ekati staff indicated that they did not support consensus as a requisite goal. The stakeholders were hesitant to get involved in a consensus process initiated by Ekati, for fear that they would be pressured into an agreement that the company might portray as a “done deal,” precluding any further discussion or intervention during the later permitting application. Ekati rejected a consensus process because of the great difficulty of reaching consensus with some many people, particularly over a short period of time. The “decision-aiding” approach favoured by some decision analysts (Gregory, McDaniels, & Fields, 2001; McDaniels, Gregory, & Fields, 1999), which emphasizes the importance of stakeholder input for fostering insight but avoids consensus as a primary goal (leaving ultimate decision making responsibility in the hands of the proponent), seemed preferred by LLCF MAA participants. Table 6-1 summarizes the differences between the two schools by comparing consensus principles (Canadian Round Tables, 1993) with a decision-aiding approach.

Explicitly presenting the MAA as a decision aiding exercise, not a consensus process, would have perhaps allayed some of these concerns. Apart from implementing the interventions described above, future application of MAA at Ekati will benefit simply from the familiarity and knowledge gained by participants during the LLCF MAA process.
Table 6-1 Comparison of consensus and decision-aiding approaches to public participation (modified from Vanderwal, 1999)

<table>
<thead>
<tr>
<th>Consensus Principles</th>
<th>Decision-aiding approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose-Driven</td>
<td>Yes (i.e., principle shared by both approaches)</td>
</tr>
<tr>
<td>People need a reason to participate in the process.</td>
<td></td>
</tr>
<tr>
<td>Inclusive, Not Exclusive</td>
<td>Yes</td>
</tr>
<tr>
<td>All parties with a significant interest in the issues should be involved in the consensus process.</td>
<td></td>
</tr>
<tr>
<td>Voluntary Participation</td>
<td>Yes</td>
</tr>
<tr>
<td>The parties design the consensus process.</td>
<td></td>
</tr>
<tr>
<td>Self-Design</td>
<td>No, this results in endless negotiations about “process” and in poor decision making.</td>
</tr>
<tr>
<td>The parties design the consensus process.</td>
<td></td>
</tr>
<tr>
<td>Flexibility.</td>
<td>Maybe, but the steps of the decision analysis process must be followed.</td>
</tr>
<tr>
<td>Flexibility should be designed into the process.</td>
<td></td>
</tr>
<tr>
<td>Equal opportunity</td>
<td>Yes, but decision analyst/facilitator is responsible for synthesizing and transmitting information.</td>
</tr>
<tr>
<td>All parties have equal access to relevant information and the opportunity to participate effectively throughout the process.</td>
<td></td>
</tr>
<tr>
<td>Respect for Diverse Interests</td>
<td>Yes</td>
</tr>
<tr>
<td>Acceptance of the diverse values, interests, and knowledge of the parties involved in the consensus process is essential.</td>
<td></td>
</tr>
<tr>
<td>Accountability</td>
<td>Yes</td>
</tr>
<tr>
<td>The participants are accountable both to their constituencies and to the process that they have agreed to establish.</td>
<td></td>
</tr>
<tr>
<td>Time limits</td>
<td>Yes</td>
</tr>
<tr>
<td>Realistic deadlines are necessary throughout the process.</td>
<td></td>
</tr>
<tr>
<td>Implementation</td>
<td>Yes, but process outcome is not restricted to reaching an agreement.</td>
</tr>
<tr>
<td>Commitments to implementation and effective monitoring are essential parts of any agreement.</td>
<td></td>
</tr>
</tbody>
</table>

The IEMA participant’s comment about consensus process also reflects issues of trust and transparency. Since this use of MAA approach was new, some stakeholders had suspicions “in the back of their mind” that it was an elaborate ruse to push through a particular option, or that its results would not be taken seriously. This is likely linked to how Ekati and its stakeholders define consultation differently, since in the past some activities interpreted by Ekati as consultation have not been regarded as such by stakeholders (Section 5.5.3), and perhaps also to issues related to negative legacies of mining in the North (Section 3.2.4). Ekati could use the Public Participation Spectrum (Figure 2-1) with its stakeholders as a tool for avoiding such problems of semantics and ensuring that both parties have a shared understanding of the intent of a consultation-
related (i.e., public participation) activity. Ekati should also strive to avoid describing activities as consultation unless they have explicitly framed them as such.

Assessing pre-determined options also led to some respondents to think that Ekati was not being completely transparent. While the facilitators did explain that the options were not fixed, no meeting time was devoted to brainstorming about adding or adapting options. A Value Focused Thinking approach to decision analysis (see Section 2.3.4) advocates creative option invention following elicitation of values and objectives. The LLCF MAA process was done in the reverse order with options developed and modified by the consultant facilitators. “Carte blanche” wide-open option invention would not have been feasible for this process because of the constrained timeline and the in-depth technical knowledge required. However, there could have been a brainstorming session at the end of the second meeting to see if there were any combinations or modifications that might have been superior to those on the table. Some opportunity for modifying options was also supported by some Ekati participants and consultants. Aspects of the LLCF MAA process that were trust-building included incorporating all the sub-accounts suggested by participants, sending out the electronic versions of the MAA ledger after the process and recording the rationales behind the scaling as requested by stakeholders.

Aspects of the MAA methodology were both praised and criticized by respondents. Dividing the large decision into smaller components (i.e., sub-accounts) helped participants to think clearly about the all the consequences associated with the decision. Ekati staff liked how the MAA could accommodate both the interests of engineers and scientists (i.e., quantitative, systematic process) and stakeholders with varied background (i.e., value-based discussion of important issues). Respondents expressed reservations with the numerical scaling and weighting. Some articulated that quantification is very difficult to do well and was at best a distraction and others noted that weighting one sub-account against another (e.g., air quality versus water quality) was problematic from an Aboriginal perspective, which emphasizes the holistic interconnectedness of nature. Another respondent thought that the scaling had been rushed and was not totally comfortable with the numbers assigned. However, this same respondent was reassured by
the robustness exhibited by the preferred option during sensitivity analysis, which was praised by other respondents as well. Although holistic rating may be difficult and it would be preferable to develop quantitative or descriptive indicators for all the sub-accounts, and use tradeoff techniques such as swing-weighting to weight the accounts (Clemen & Reilly, 2001; Hobbs & Horn, 1997), this level of effort may not be justified for a decision of this nature and consultation process of this timeframe and scope. The quantification process may not always be necessary to select a preferred option but it does permit easy sensitivity analysis, which is a very powerful tool for testing and communicating decisions.

Respondents also made observations about the level of effort and resources (i.e., time and money) required to organize and host a MAA process and remarked that not every decision requires extensive consultation and intensive process like MAA should not be initiated unless the company is committed to following through and doing it properly.

Another observation by a community respondent was that the best way to get community input would be to run through a modified version of the MAA in the community, with full participation of the elders and interested community members, rather than just sending a few representatives. While repeating the full-scale MAA in each community would not be feasible, going over the key aspects and issues of the MAA in this context could be valuable. This community respondent planned to present the results of the MAA in a community meeting. Ekati made an open offer at the last meeting to come and discuss the LLCF MAA process in the communities, so this is a possibility if interest is expressed.

As noted in Section 5.5.5, some respondents qualified their judgments on the MAA process by noting that the final decision on what plan would be submitted to the MVLWB for permitting had not yet been made. Had the interviews been conducted after a plan had been submitted for permitting, the relative importance of some of the themes may have changed. For example, concerns expressed in the trust and transparency theme
that Ekati might ignore the results of the participatory MAA process would have proved to be correct or incorrect.

6.2.2 MAA methodology
In the previous section a number of possible improvements to the application of MAA in the Ekati case study context were discussed. These are in response to participant feedback and my observations of this particular process, but the same interventions (e.g., explaining objectives and expectations of participants at the start of the MAA) would apply in most contexts.

Decision analysis includes a suite of tools and techniques (described in Section 2.3) that improve decision making, as demonstrated by the behavioural decision research literature (see Gregory et al., 2001 for a list of the common decision traps that decision analysis is designed to counteract). For example, constructed scales can be developed for indicators without a natural measure (i.e., pH, cost) and swing-weighting can be used to assess tradeoffs, which is cognitively less complex than giving a sub-account a holistic rating (Clemen & Reilly, 2001). A number of these techniques could be integrated into the MAA methodology as practiced in the Ekati case study. However, each of these tools demands additional resources and research.

The cases studies examined in the literature review that used these more sophisticated techniques appeared to require more effort than the LLCF MAA process (McDaniels et al., 1999) or involved a group of participants with a more consistently high level of pertinent knowledge of the decision context (Gregory & Keeney, 1994). For example, BC Hydro’s Water Use Planning processes were typically two years and up to three years in duration (Steve McFarlane (DFO), personal communication, Mar. 11, 2004). Therefore, the following suggestions are intended to be pragmatic and easy to incorporate with minimal additional effort:

- The MAA should be introduced as a “decision-aiding” process, not a consensus process. Stakeholder should be reassured that their participation does not preclude
participating in the normal consultation forums (e.g., during the permitting process) and that the results will not be portrayed as a binding consensus decision. This also helps to manage potentially unrealistic expectations, such as unconditional implementation of the preferred option of the MAA without further proponent consideration;

- The MAA process (and its role within the broader company decision-making and implementation procedure) should be explained thoroughly at an early stage, using simple examples to illustrate how each step contributes to the end product;

- Conducting individual (or focus group) interviews to elicit objectives outside the full group meetings would better ensure that all participants have their values well represented and would make efficient use of meeting time. The facilitator /decision analyst could develop appropriate indicators for the objectives gathered in the interviews, and then review this in the next meeting;

- Some time in the process should be specifically set aside for brainstorming new or modified options. If there is no likelihood that options will be changed significantly, this should made clear to the participants. However, allowing for some flexibility in options helps build trust in the process and leverages the creativity of a wide range of stakeholders;

- The assigning of impacts (scaling) by quantification should be emphasized as an iterative process so that participants are aware that the impact values may be modified as new information or insights become available. This reinforces the objective of the MAA to foster insight, not make a final, definitive choice of one option;

- Describing the key drivers for each sub-account (as was done after the final MAA meeting) is important for adaptive management and should be done concurrently with assigning scaling numbers, as much as possible;

- In additional to the “Level of Confidence in Assessment” column, an “Uncertainty” column should be added to the MAA ledger so that inherent uncertainty in the sub-account can be flagged separately. Level of confidence in the assessment (e.g., high confidence that Option 1 is vastly superior to Options 2 and 3) is different from the uncertainty in the sub-account indicator itself (e.g.,
increased permafrost degradation due to climate change). From an adaptive management perspective, identifying and reducing uncertainty over time is more important than the level of confidence in relative scaling of options in a single decision process;

- The aim of the weighting process should be explained as making tradeoffs between certain ranges of impacts to a part of a system, different from rating the relative importance of the underlying biophysical systems. This framing should help to avoid putting Aboriginal participants in the philosophically untenable position of rating the importance of water versus land, for example; and
- Changing the meeting schedule from several one or two-day meetings to 10 shorter meetings (i.e., two or three hours in duration), as is typical for many SDPs (Robin Gregory, personal communication, Jun. 14, 2004), could address the issues of participants feeling rushed by breaking the information transfer and elicitation into smaller, more manageable parts and allowing time in between for reflection. This would have been cost prohibitive in the Ekati case study due to the great distances traveled by participants to attend the meetings, but would be practical in more urban settings.

6.2.3 Further application of Structure Decision Processes in the mining industry

The most important entry point for further adoption of SDPs in the mining industry is as an alternative to existing consultation practices such as workshops that do not involve stakeholders directly in the decision process (and hence are generally less costly and time-consuming), and not for less frequent but more intensive applications such as policy analysis. SDPs must therefore provide significant additional benefits without incurring cost increases that make it unviable for this application.

MAA, as currently practiced, has several attributes that make it well suited for this entry point. Firstly, it begins with an objectives by alternatives table (i.e., the MAA ledger) that already includes the major objectives (accounts) that commonly appear in high-concern mining issues (e.g., environmental, project economics, etc.), thus reducing the effort required to develop context-specific objectives. Secondly, Robertson Geoconsultants, the sole provider of MAA services in the Canadian mining industry, has considerable
mining-specific expertise, strong credibility in the industry and is able to integrate MAA with other more widely-used engineering design and risk assessment services. Mine-stakeholder relations are often sensitive so SDP practitioners in this context ideally should have the trust of the proponent, mining-specific and decision analysis expertise, as well as facilitation and communication skills.

Other more sophisticated and labour-intensive SDP approaches such as the Multi-Attribute Tradeoff Analysis approach employed by BC Hydro in their Water Use Planning process may be appropriate in applications where more resources are available, such as for regional and cumulative effects assessment in mining regions (e.g., the Fort McMurray oilsands in northern Alberta or the diamond mining region around Great Slave Lake in the NWT) where resources can be pooled. Large EAs may carry enough resources to justify this level of effort, but mining companies may be reluctant to release to the public the necessary information for conducting a SDP at such an early stage, particularly when there may be a perceived risk that this information could be used against the project in the EA and permitting process.

More sophisticated decision analysis approaches may also be required for more controversial decisions in higher-conflict contexts. The Ekati case study did not involve a particularly controversial decision, given the positive track record of the LLCF, and there was a reasonable rapport and level of trust amongst the participants. Furthermore, the dominance of the preferred option from the MAA (option 3a) was shown to be fairly insensitive to changes in weighting during sensitivity analysis. In decision contexts with lower trust and no such dominant alternative, more time and more involved approaches may be necessary. For example, the roles of decision analyst/facilitator and design engineer, which were melded successfully in the Ekati case study, may need to be divided in a low trust environment to avoid perceptions of bias.

Adoption of SDPs in the Canadian mining industry could be facilitated by incorporating them as an additional tool for decision-focused consultation in MAC's External Outreach & Dialogue Field Guide (2003) and other resources associated with the Towards
Sustainable Initiative (TSM). SDPs are compatible with the Guide’s stated goal of enabling company representatives to “plan and conduct effective outreach and dialogue with their communities of interest” by providing MAC member companies with “a leading-edge, science-based process supported by techniques and tools” (ibid., p. 4).

It may be that SDPs are most effective when used as part of a comprehensive consultation strategy that includes community or stakeholder advisory boards such as the Community of Interest panels advocated by MAC. By having such standing forums for listening and responding to stakeholder concerns of any type, the likelihood of SDPs being used as a platform for airing grievances or issues outside the decision context of the SDP would be reduced. These advisory board forums would hopefully also help to build trust in the company, enabling SDPs to be conducted efficiently, without wasting any of the parties’ time.

6.3 Comparison to criteria in literature
In this section the themes that arose inductively from the critical incidents gathered during the interview process are analyzed and compared to public participation evaluation frameworks from the literature described in Section 2.2.2. While the list of evaluative frameworks discussed are by no means exhaustive, they do include a broadly representative range, from the utilitarian practitioner rules of thumb (Beierle, 1998) to Webler’s (1995) rigorously theoretical fairness and competence framework. I discuss the strength (S) and weakness (W) themes together, in order of importance (in terms of percentage of respondents who mentioned the theme and number of critical incidents per theme).

Learning (S) is represented in many of the evaluations frameworks. It encompasses both access to information and understanding. Beierle’s (1998) social goals include “educating and informing the public,” Webler’s (1995) criteria of “competence” includes access to information for developing the most valid understanding possible and Rowe and Frewer (2000) include access to the appropriate resources (e.g., knowledge and information of
the decision context as resource), which is also featured in Beierle’s (1998) practitioner rules of thumb.


Facilitation (S) is mentioned in Beierle’s (1998) practitioner rules of thumb, but is for the most part an instrumental factor in meeting other goals such as fairness, fostering open dialogue and managing the use of resources (e.g., information and time). Since the facilitators in the case study process also played an active role as experts (in contrast to a traditional, process-focused facilitator role), the expertise and experience aspects of this theme are linked to Weblor’s (1995) competence criteria.

Unequal and uneven participation (W) is a negative reflection of the criteria of the engagement and representation of values strength themes. This reinforces the salience of those criteria and indicates that although the case study process supported fair involvement and interaction of stakeholders, it did not attain their ideal state.

Trust and transparency (W) was related to constrained option creation and the concerns this raised with respondents, largely due to negative past experiences related to differing definitions of consultation. This corresponds to the building trust criteria of Beierle’s (1998) social goals. As noted in the engagement theme, transparency was generally characterized as a strength of the LLCF MAA process, with the exception of the constrained options.

Representation of values (S) includes two of the most common criteria, namely representation of the major stakeholders and integrating public values into decision making. Both are mentioned by Weblor (1995), Beierle (1998) and Rowe and Frewer
(2000) and the latter is included in the practitioner rules of thumb. The corresponding weakness theme (representation) also applied to these criteria. This theme related to the perceived inability of the process to adequately incorporate some (namely Aboriginal) interests.

Time constraints and time management (W) merit only a passing mention in Beierle’s (1998) practitioner rules of thumb along with other resources (i.e., time, financial support). It is likely that time featured more prominently in the case study data because it was challenging to stick to the agenda timelines since the process was compressed into a total five days of meetings. Respondents also noted positive management of time constraints in the facilitation strength theme, which is a component of the cost-effectiveness themes proposed by Beierle (1998) and Rowe and Frewer (2000).

Methodology (S) relates to the substantive quality of decisions criteria included by Webler (1995) and Beierle (1998). In particular, structuring and decomposition, as well as sensitivity analysis were highlighted for their contribution to thinking clearly about the decision. Rowe and Frewer (2000) include a criterion of structuring decision making (largely for displaying the process and outcome) but notably omit any criteria on improving decision quality. The concerns about methodology (in the weakness theme) were mostly related to the quantification process; some respondents thought it had been done a little too quickly and subjectively and others didn’t think this latter step was necessary. Both of these are linked to decision quality.

Better explanation of process (W) is expressed in the practitioner-oriented frameworks, as clarity of goals and roles of participants (practitioner rules of thumb) and task definition (Rowe & Frewer, 2000).

Continuity and review (W), emphasizing the importance of maintaining a consistent group throughout the process, is not included in any of the evaluative frameworks. Continuity does however indirectly influence effective use of time and substantive
decision quality (due to maintaining or losing knowledge and experience gained by participants during the process).

Venue and scheduling (S and W) themes were mutually contradictory and did not show any important trends. Adequate meeting facilities undoubtedly play a role in the success of public participation processes, but this is a relatively minor consideration, and none of the evaluative frameworks include it as a criterion.

The range of criteria associated with the inductively generated empirical themes is a mixture of process and outcome criteria, consistent with Chess' (2000) call for methodological pluralism. Themes that feature prominently among the evaluative frameworks but were absent from the themes include shared decision-making power (Beierle’s (1998) practitioner rules of thumb; Fiorino, 1990; Webler, 1995), independence in agenda-setting (Fiorino, 1990; Rowe & Frewer, 2000) and cost-effectiveness (Beierle’s (1998) social goals and practitioner rules of thumb; Rowe & Frewer, 2000), in terms of monetary cost. I attribute these differences to the corporate context of the case study. My hypothesis is that stakeholders did not expect, or perhaps even feel entitled, to share in determining the overall agenda or making the ultimate decision, given their past experiences in consultation with the company (which were less participative processes) and because they recognized the company’s legitimate right to make the choice of what plan they would submit in a permitting application to the MVLWB. This is not to say that stakeholders did not expect to substantively influence the decision, or pursue their own mandate within the broader agenda of the process (i.e., select a management plan for the LLCF). They also were aware that they would have another opportunity to influence the final outcome before an independent board (the MVLWB) during the permitting process. Fairness is no less important in the corporate context, but perhaps there is a different understanding of what this means to stakeholders in such processes. Cost-effectiveness was mentioned by a few respondents (Ekati staff and consultants) but was not a prominent theme because Ekati was responsible for the direct costs of planning and hosting the meetings. Stakeholders were only required to contribute their time.
In a government agency context similar to the case study, the public’s right to be involved in agenda setting and decision-making could be strongly argued from a democratic rationale. Similarly, government-sponsored public participation processes are funded through taxpayer dollars, so the public is aware of the (admittedly indirect) link between cost-effectiveness and their “back pocket.”

Time management proved to be a more significant factor than the evaluative frameworks would appear to indicate. Having sufficient time for analysis and deliberation is intuitively an important driver of substantive decision quality. Yosie and Herbst (1998) note that poorly managed process can lead to participant burnout. Perhaps the criteria of allowing sufficient time for deliberation has relatively more importance in the corporate context because companies have more aggressive timelines and are subject to time-dependent market opportunities, whereas government agencies are under far less pressure to make rapid decisions.

In summary, the themes from the case study predictably bear strong resemblance to the evaluative frameworks found in public participation literature. Webler’s (1995) meta-criteria of fairness and competence are equally applicable in the government and corporate context. However, certain aspects of his criteria and others, namely shared decision-making and agenda setting, and cost-effectiveness have relatively less importance to stakeholders in the corporate context, while allowing sufficient time for deliberation is relatively more salient.

6.4 Limitations and generalizability
The findings of this study are considered to be generalizable to the NWT mining context. Most major mine decisions in the NWT requiring some form of permitting would involve the same or similar organizations and Aboriginal groups, and would be subject to similar constraints around travel and scheduling. Although the NWT regulatory system is slightly different from the rest of Canada due to the roles that co-management boards such as the MVLWB play, the major stakeholder groups, namely regulatory agencies and Aboriginal groups, are key stakeholders virtually everywhere in Canada. The findings are therefore
also reasonably generalizable in the pan-Canadian mining sector, and to a lesser extent in the American and Australian contexts, which feature similar regulatory systems and politically organized Aboriginal peoples. Outside these countries in the western developed world, increased presence of international stakeholders (both NGOs and financing institutions such as the World Bank Group), weaker government capacity and transparency and greater discrepancy in access to resources between local and other stakeholders render the conclusions of this study less generalizable.

Participant factors that limit generalizability include the uniqueness of the IEMA and absence of other stakeholders, such as more traditional ENGOs or municipal governments. Other consultation processes that relate to different stages of the mine life cycle (e.g., pre-operation permitting or near closure) or are situated closer to larger population centers would likely feature these other stakeholders more prominently. The LLCF decision context was also relatively narrow since it looked at an existing facility and had negligible range of socioeconomic impacts.

The greatest limitation of this study is that it does not give sufficient voice to Aboriginal concerns. Although this is in part due to the low number of Aboriginal participants in the LLCF process itself, and a number of non-Aboriginal respondents who work for First Nations were interviewed, there was only one Aboriginal respondent in the study. Given that the study data indicated that the four community respondents gave markedly lower assessments of their previous consultation experience, satisfaction with MAA outcome and recommendations for future use of MAA than the mean, this perspective merits more consideration.

Another possible limitation is that I may have been perceived to be too close to BHP and its consultants. Since my point of entry into the case study was through initial contact with the facilitating consultants (through undertaking a short course taught at UBC), respondents may have been reticent to voice strongly critical opinions of them or the company. I made an effort of speaking informally to all the participants over the course of the meetings, partly to gather preliminary unstructured feedback but also as an attempt
to demonstrate my neutrality. I also made sure that I began the interview questions with a statement to the effect of letting the respondent know that I expected to hear valid criticism of the LLCF MAA process and Ekati’s consultation program in general. Overall my perception is that this was not a significant limitation, but it does bear mentioning so that the reader can come to his or her own conclusion.

6.5 Suggestions for further research
The present research has assessed the effectiveness of SDPs in consultation in the mining industry by gathering the experiences of a broad range of participants in a specific case study context. It has also compared a representative sample of public participation evaluation frameworks with themes arising from the corporate-context case study.

Follow-up interviews with the respondents of the LLCF case study during and after the permitting process for the plan would be informative. Several respondents gave the caveat with their responses that their final judgment would only come after the permitting process. Looking at the quality of the ultimate decision outcome is another important issue that fell outside the scope of this thesis study. This could be done by developing and assessing the future performance of the LLCF against its performance in the five or so years prior to this consultation process. Many of the accounts and sub-accounts could easily be translated into performance indicators (a number of indicators such as discharge water quality are currently monitored in Ekati’s environmental monitoring programs (BHP Billiton, 2003a)).

Future research could assess the experience each of the participating groups separately to gain a richer understanding of how SDPs could best meet each of their interests. In particular, this study indicated that Aboriginal communities are least satisfied with consultation activities, but this group was least well presented in the study.

Assessment of the application of SDPs to the initial environmental assessment and permitting of mining projects would be valuable. Employing SDPs early in this process, in developing the terms of reference of the EA for example, has great potential for
improving the relevance and quality of EA while minimizing conflict and inefficient use of resources (both time and money). However at this early stage mining companies face a lot of uncertainty and may be inclined to “get the thing permitted” before taking the necessary risks of transparency and “deep” engagement that SDPs require. An assessment of the strengths and weaknesses of this high risk-high reward venture, as well as drivers for adoption, would be beneficial. Gregory, Keeney & von Winterfeldt (1992) present a brief assessment of applying decision analysis to the American EA process, but a more thorough study in the Canadian context is merited.

Examination of the ability of SDPs to meaningfully involve groups of stakeholders with large discrepancies in technical knowledge, worldview and language would also be valuable. This is salient for the consultation processes in the developing world, where the discrepancies between parties are more significant. This study has hinted that the “divide and conquer” approach to decisions advocated by decision analysts may be weakly compatible with the holistic worldview held by most Aboriginal peoples.
Chapter 7 Conclusion

The research question guiding this thesis was: “Are Structured Decision Processes an effective methodology for involving stakeholders in consultative decision-making in the mining industry?” In order to address this question, an evaluation of the Long Lake Containment Facility Five-Year Review consultation process at the Ekati Diamond Mine was conducted. This consultation process used a Structured Decision Process (SDP) called Multiple Accounts Analysis (MAA). This was the first time a decision analysis-based process had been used for project-based consultation with wide stakeholder involvement in the Canadian mining industry. The main conclusions of this thesis are summarized below:

- Stakeholders have greater expectations for consultation in mining decisions than ever before. Decision analysis provides a framework for meaningful stakeholder involvement and good decision-making;
- Participants in the Ekati case study considered the use of MAA to be successful and the process resulted in a preferred option with broad support. A strong majority (71%) of respondents were satisfied with the outcome of the process and an even greater majority (85%) recommended the use of MAA in future consultation processes;
- Respondents were not able to think of a better method than MAA for this particular consultation process. Suggestions for improvement were primarily related to how this method could be better applied. For example, some deliberation could have been done in small groups to draw out quieter participants, and participants could have been involved in creating or modifying the decision options under consideration;
- Stakeholders were supportive of the advisory “decision-aiding” (i.e., non-binding) role of the MAA process but were interested in seeing how the company would use the results of the process;
- Aboriginal community participants were less positive about MAA than the other groups. One of the key challenges of a Structured Decision Process approach to
consultation is accommodating the wide range of technical expertise and experience on the decision topic;

- The Ekati consultation process did not involve a particularly controversial decision. A more controversial context may require the use of more sophisticated but more resource-intensive decision analysis tools such as those used by BC Hydro in their Water Use Planning processes;

- SDPs require earlier involvement of stakeholders, transparency with relevant data and have more “up front” costs than typical consultation activities such as workshops or public meetings. The rewards, such as better and more acceptable decisions, greater capacity for collaboration with stakeholders, more expedient permitting, are mostly longer-term;

- Since SDPs are focused on specific decision, they may be most effective as part of a comprehensive consultation program that also includes a forum for less structured, less time dependent dialogue with stakeholders (e.g., advisory board);

and

- SDPs seem to be particularly well-suited for decisions that require major permit applications, since they typically already involve intensive consultation. Ekati participants indicated that they would like to use MAA in future consultation processes.
References


MiningWatch. (2000). *On the Ground Research: A Research Agenda for Communities Affected by Large-Scale Mining Activity*: MiningWatch Canada.


Appendices
Appendix A: UBC Ethics Approval Letter
Appendix B: Participant Letter of Initial Contact
Appendix C: Questionnaire
III. LLCF Multiple Accounts Analysis Section:

This section asks you questions about your experience and opinions of this Multiple Accounts Analysis (MAA) process. For the following statements, please mark the single most appropriate response. Please add any comments you have in the spaces provided.

8. I am satisfied with the outcome of the MAA.
   □ Strongly Disagree □ Disagree □ Undecided □ Agree □ Strongly Agree

9. I would recommend the use of MAA in future consultation processes.
   □ Strongly Disagree □ Disagree □ Undecided □ Agree □ Strongly Agree

Comments: ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

(If you need additional space please write on the reverse of this page)

IV. Concluding Remarks

Would you be willing to have a confidential personal interview to discuss your experiences and opinions on this Multiple Accounts Analysis consultation process?

   □ Yes Contact Phone #: ________________________________
   □ No

Thank you for taking part in this questionnaire and I look forward to discussing your experience in more detail in the interview. If you have any questions or concerns, please contact Andrew Thrift at (669-6452) or by email at thrift1998@hotmail.com.
Appendix D: Interview Consent Form
Appendix E: Interview Questions
Assessing the Application of Multi-Attribute Decision Analysis in Stakeholder Consultation in the Mining Industry

INTERVIEW QUESTIONS

Background questions (10 min)

1. To begin with please you tell me about your role (position) and responsibilities in the organization you represent.

2. On the questionnaire I handed out at the close of the LLCF MAA you indicated that:
   a) this is the first consultation process with Ekati you have taken part in. Is that correct? Do you have any experience with consultation with other companies or organizations?
   b) you have been involved with consultation with Ekati for X years and have experience with public hearings, workshops (list all the types they wrote on the questionnaire). Did I miss anything or is there anything you want to add to that list?

3. a) You also indicated on your questionnaire that you [have/have not] participated in structured decision making processes like Multiple Accounts Analysis (i.e., a group decision-making process that involved listing the important decision criteria, predicting impacts and weighting their relative importance).
   
   b) [If yes] Can you describe for me those processes, in terms of what decision was to be made and who participated?
   • Who initiated and facilitated the process?
   • What feedback did participants give about the process?

4. How would you describe your overall impressions of your previous consultation experience with Ekati, in a few sentences?[Generally positive, generally negative, mixed]

5. What did you see as your role coming into the LLCF consultation process? [Clarification: What responsibilities or contributions to the process did you bring to the table?]

6. What were your expectations coming into this LLCF consultation process?
Strengths and weaknesses (45 min)

Thanks for the background information. Now I would like to ask you about the things you liked and didn’t like about the LLCF MAA. I am first going to ask you about the things you liked and then about the things you didn’t like. I will ask about each meeting separately. You attended [all/first only/…] of the three meetings. Is that right?

First meeting

• Can you give me a specific example of what you liked about the first meeting?(ask for examples) What was effective? What was helpful?

Thanks for that example. I am going to continue asking you the same question to make sure that I get all of your ideas. Is there anything else you liked? (repeat until no more new)

• Can you give me a specific example of what you didn’t like about the first meeting? What else? (repeat until no more new)

Second meeting.

• Can you give me some specific examples of what you liked about the second meeting?
• Can you give me some specific examples of what you did not like about the second meeting?

Third meeting

• Can you give me some specific examples of what you liked about the third meeting?(ask for examples of factors)
• Can you give me some specific examples of what you did not like about the third meeting? What else?

Before we move on, are there any other specific examples of what you thought was positive or negative about any of the three meetings?

Specifics (5 min) - address these after more open-ended strengths and weaknesses questions

Thanks for sharing your assessment of the process. Before we end the interview, I just have a few more questions that I would like to ask.

7. You weren’t able to attend the [first/second, etc.] meetings. This process has been quite lengthy and I know there are lots of good reasons why people couldn’t make some of the meetings. Can you tell me why you did not attend the [first/second] meeting?

8. What are some ways that the MAA process could be improved?
9. Those are good suggestions for improvement. Apart from improving the MAA process, can you suggest any different consultation methods that would better than MAA for consultation activities like the LLCF consultation?

Your questionnaire gave me an understanding of your initial impressions of the MAA process. I would like to know if having reflected back on the process has changed your opinion, so I am going to ask you the following two questions again.

10. I am satisfied with the outcome of the MAA.

☐ Strongly ☐ Disagree ☐ Undecided ☐ Agree ☐ Strongly Disagree Agree

11. I would recommend the use of MAA in future consultation processes.

☐ Strongly ☐ Disagree ☐ Undecided ☐ Agree ☐ Strongly Disagree Agree

 Closure

12. Thanks again for taking the time to do this interview. Before we close, is there anything else about the MAA or Ekati's consultation program that you would like to discuss?
Appendix F: Multiple Accounts Analysis Ledger from LLCF Five Year Review Process
### Key Drivers in Assessments

<table>
<thead>
<tr>
<th>SUB-ACCOUNTS</th>
<th>INDICATORS</th>
<th>ACCOUNTS</th>
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<th>SUB-ACCOUNTS</th>
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<th>INDICATORS</th>
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<th>Early progressive reclamation</th>
<th>Option 2</th>
<th>Option 3a</th>
<th>Option 3b</th>
<th>Option 3c</th>
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<th>Optimized B &amp; C</th>
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<th>Discrimination Value (based on 30% Diff)</th>
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<td>Ease of construction</td>
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<td>Ease of operation / Simplicity</td>
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**MAA SPREADSHEET FOR EKATI PK MANAGEMENT OPTIONS — RESULTS OF MAA MEETING FEB 7-8, 2005**

**VERSION 1: FEB 8TH GROUP REVISED MAA**

**Technical**
- **Construction**
  - Ease of construction
  - Degree of seasonal restrictions

**Operation**
- Flexibility within the option
- Inter-option flexibility
- Long-term operating flexibility
- Ease of operation / Simplicity
- Level of assuredness of operation / precedent in the North

**Beach erosion**
- Degree of water erosion
- Degree of wind erosion

**Ice entrapment**
- Potential for minimizing ice entrainment
- Potential for stability of permafrost with LLCF

**Internal drainage system**
- Erosion
- Stability

**External drainage system**
- Erosion and stability
- Ability to divert run-on
- Ease of construction

**Commentary**
- Flexibility to adapt in the future for disposal in other cells or by other means if needed
- Flexibility to switch to features of other options or entirely to another option at some point in the future
- Flexibility to add additional volumes within the options without considerable amounts of re-engineering
- Options that put the least amount into Cell D
- The ability to operate on a day to day basis, the components of each option
- The operation of a PK system using jetties is not preceded in the North where seasonal restrictions are so great. Those options with jetties ranked lower than those without
- The weak areas of the beaches approaching the pond edges are considered poorly trafficable, except when completely frozen. The options with greatest pond/beach shoreline considered less favorable
- The longer the beaches, the greater the potential for sheet erosion. The longer the beaches, the greater the potential for wind erosion. The aspect of the beaches also considered, but to a lesser extent as wind direction is variable, but predominantly from the north across LLCF
- The stability of permafrost will be enhanced by minimizing standing pools of water and by creating the most stable landform. The dry long beaches of Options 3a, 3b and 3c are considered favourable, Option 1 with pools is less so and Option 2 with the greatest potential for cross beach erosion considered least
- The longer the beaches, the greater the potential for cross beach erosion. The three Option 3 variants include measures to route the drainage around the LLCF beaches whereas Options 1 and 2 include substantially more cross-beach drainage which are more susceptible to erosion. A secondary consideration is the larger ponds of water and the area of contact with the PK beaches. Option 3c and to a lesser extent Option 3a were down-rated compared to Option 3b due to this consideration
- Similar to above, the options with greatest shoreline and cross-beach drainage considered less stable than those with less

**General**
- Options 1 and 2 have no external drainage system - therefore favored in this indicator. Options 3a through 3c considered the same
- Options 3a to 3c have a greater ability to divert run-on due to the external drainage system (in particular beside Cell B) whereas Options 1 and 2 will have minimal run-on across Cells B and A
- No construction required in Options 1 and 2, Options 3a through 3c have minor construction (primarily fill in low spots)
Environmental Techincal Accounts

| ACCOUNTS | SUB-ACCOUNTS | W | INDICATORS | Option 1b | Option 2a | Option 3a Optimized A | Option 3b Optimized B & C | Option 3c Optimized B & C (with US rates) | Level of Confidence in Assessment | Discrimination Value (based on 25% of) | GENERAL COMMENTS/INFO GAPS | KEY DRIVERS IN ASSESSMENTS |
|----------|--------------|---|------------|-----------|-----------|----------------------|--------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| Use of Cell D | 8 | year deposition required | 9 | 4 | 3 | 8 | 9 | 8 | 54 | Options 1 and 2 require Cell D deposition in 2007, Options 3a and 3c in early 2015 and Option 3b in mid to late 2015 | Options 1 and 2 require Cell D deposition in 2007, Options 3a and 3c in early 2015 and Option 3b in mid to late 2015 | Options 1 and 2 require Cell D deposition in 2007, Options 3a and 3c in early 2015 and Option 3b in mid to late 2015 |
| sub-account score | 4.00 | 3.00 | 8.00 | 9.00 | 9.00 | 9.00 | 9.00 | 9.00 | 9.00 | 9.00 | 9.00 |
| Cover system | 6 | ability to minimize surface irregularities (including frost heaving) | 5 | 3 | 7 | 9 | 9 | 9 | 30 | Long dry beaches considered to have less surface irregularities, option 2 may have some due to internal drainage system and greater anticipated ice entainment, option 1 with jetties and soft touts between jetties anticipated to have most irregular surface |
| differential settlement/torsion | 5 | 7 | 9 | 9 | 9 | 9 | 9 | 12 | Not considered to be substantial in any case, but possibly greater in Option 1 with larger pending potential between jetties and likely greater ice entainment than other options |
| subsidence/sinkholes - same as potential for stability of permafrost (see above) | 0 | ND | 0 | ND | 0 | ND | 0 | ND | 0 | ND |
| sub-account score | 5.18 | 8.00 | 9.00 | 9.00 | 9.00 | 9.00 | 9.00 | 9.00 | 9.00 | 9.00 | 9.00 |
| Permit complexity | 6 | potential for permitting constraints | 6 | 9 | 8 | 8 | 7 | 8 | 12 | ND | Related primarily to footprint area, option 3b includes the area between LLCF and the waste rock dump that is currently not part of the LLCF |
| sub-account score | 6.00 | 8.00 | 9.00 | 7.00 | 9.00 | 9.00 | 9.00 | 9.00 | 9.00 | 9.00 | 9.00 |
| Terrestrial impacts | 8 | quality & sustainability of vegetative cover | 9 | 6 | 8 | 9 | 8 | 9 | 27 | While none of the options are believed to have a significant vegetative cover during operations, progressive reclamation, to the extent possible would be worked into all options, therefore the quality and sustainability is ranked here on the basis of favoured options having least water table fluctuations, inundation and greatest erosion protection |
| metal uptake effects on wildlife | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 0 | ND | All options considered the same |
| degree of deference to wildlife | 6 | 9 | 9 | 9 | 9 | 9 | 9 | 0 | ND | All options considered the same |
### MAA SPREADSHEET FOR EKATI PK MANAGEMENT OPTIONS - RESULTS OF MAA MEETING FEB 7-8, 2005 — VERSION 1: FEB 8TH GROUP REVISED MAA

<table>
<thead>
<tr>
<th>ACCOUNTS W</th>
<th>SUB-ACCOUNTS W</th>
<th>INDICATORS</th>
<th>Option 1b</th>
<th>Option 2</th>
<th>Option 3a</th>
<th>Option 3b</th>
<th>Option 3c</th>
<th>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B. All options considered equal except Option 1 which was down-rated slightly due to the lack of personnel.</th>
<th>GENERAL COMMENTS/INFO</th>
<th>KEY DRIVERS IN ASSESSMENTS</th>
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<td>4 9 9 8 8 8 4 NO</td>
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<td>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B.</td>
<td>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B.</td>
<td>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B.</td>
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<td>8.04 7.86 8.86 8.54 8.96 8.68</td>
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<td>any option, prog rea to the extent possible be done as soon as possible</td>
<td>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B.</td>
<td>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B.</td>
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<td>7.00 9.00 4.00 4.00 4.00</td>
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<td>Recclamation could begin immediately in Option 2 as well as in the north part of Cell B in Option 1, the south end of Cell B in Option 1 could begin in 2007. Options 3c through 3b would be delayed until 2012 for complete recclamation of Cell B, but the north end could be fast tracked for recclamation earlier (~2009)</td>
<td>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B.</td>
<td>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B.</td>
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<td>0.00 0.00 9.00 8.00 6.03</td>
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<td>Options 1b with the required and continual construction of jetties over soft PK zones was least favoured, Option 3b was also down-rated slightly due to the need to construct the long central jetty, other options considered the same. Note that the central jetty in Option 3b is not considered as great a risk as the jetties in Option 1 due to the alternative discharge locations available in Option 3b if jetty construction was stalled.</td>
<td>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B.</td>
<td>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B.</td>
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<td>8.35 7.32 3.73 8.59 8.45</td>
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<td>Considered sustainable for all options (no net water loss anticipated)</td>
<td>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B.</td>
<td>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B.</td>
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<td>8.17 7.25 6.67 6.67 6.67</td>
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<td>A diverse closure landform would result during the operations of Option 1, with less desirable landform &quot;engineering&quot; being attainable during operations for Options 2 and 3a through 3c respectively. All options considered equal except Option 1 which was down-rated slightly because of the difficulty in being able to do any earthworks on closure to maximize the landform desired for closure.</td>
<td>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B.</td>
<td>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B.</td>
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<td>8.00 6.43 8.43 8.66 8.43</td>
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<td>This substantially refocuses the volume for settling in Cell D and therefore the total volume and time for placement of PK into Cell D. Options 1 and 2 have very similar volumes and timing, Option 3b has the least amount and the greatest volume and time for placement of PK into Cell D, and Options 1a and 3c have very similar volumes and timing. Option 3b has the least amount and the greatest volume and time for placement of PK into Cell D, and Options 1 and 2 have very similar volumes and timing.</td>
<td>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B.</td>
<td>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B.</td>
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<td>9.00 8.00 8.00 7.00 8.00</td>
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<td>This indicator is ranked based on length of slope and, to a lesser extent, on aspect. The options with PK beaches sitting higher in the landscape are likely more susceptible to dust. The cover will minimize long term dust impacts on any of the options.</td>
<td>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B.</td>
<td>Options 3a through 3c could have an impact to the permafrost regime in those areas that would be covered by the discharge from the higher Cell A and B roads, as well as along the external drainage system route adjacent to Cell B.</td>
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## MAA SPREADSHEET FOR EKATI PK MANAGEMENT OPTIONS – RESULTS OF MAA MEETING FEB 7-8, 2005 –
### VERSION 1: FEB 8TH GROUP REVISED MAA

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<th>INDICATORS</th>
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<th>Option 2 Early progressive reclamation</th>
<th>Option 3a Optimize A, B &amp; C (with US rates)</th>
<th>Option 3b Optimized A, B &amp; C (off WRD)</th>
<th>Option 3c Optimized A, B &amp; C (N-S July)</th>
<th>Level of Confidence in Assessment</th>
<th>Discrimination value (based on 30% diff)</th>
<th>GENERAL COMMENTS/INFO</th>
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<td>degree of reference to wildlife</td>
<td>5</td>
<td>5 9 9 0 9 9 0 0 9 9 0 0 0 0</td>
<td>0</td>
<td>ND</td>
<td>All options considered to be equally distant to wildlife</td>
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<td></td>
<td>degree of impact to future thermal regime</td>
<td>5</td>
<td>7 7 9 9 9 9 0 0 9 9 0 0</td>
<td>10</td>
<td>ND</td>
<td>The high, dry beaches are likely to have greater potential for sand than Options 1 and 2, the ponding, and interaction with drainage across the beaches etc.</td>
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<td></td>
<td>sub-account score</td>
<td>5</td>
<td>8.47 9 9 0 0 0 0</td>
<td>0</td>
<td>ND</td>
<td>Option 1 will have the most undulating landform and therefore greatest diversity in this regard, followed by Options 2, 3a and 3c and lastly, Option 3b.</td>
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<td></td>
<td></td>
<td>degree of diversity</td>
<td>5</td>
<td>9 8 8 8 7 8 9 9 7 8 9 9</td>
<td>10</td>
<td>ND</td>
<td>Similar to water quality, the greater the variety the greater the safety, settling etc. between the PK and the downgradient environment, the higher the degree of protection and more favourable the option.</td>
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<td>sub-account score</td>
<td>9</td>
<td>0 0 9 0 8 0 0 8 0 8 0 0</td>
<td>0</td>
<td>ND</td>
<td>The east dam is the primary structure evaluated here. There is a chance that either it can be avoided or that a less substantial dam would be required in Options 3a through 3c than in Options 1 and 2.</td>
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<td></td>
<td></td>
<td>degree of protection of downgradient aquatic system</td>
<td>9</td>
<td>5 5 5 9 9 9 0 0 9 9 0 0</td>
<td>36</td>
<td>D</td>
<td>The safety of wildlife is likely fairly similar across the options in the long term. Options 1 was slightly down-rated because of the greater anticipation of ponded area and weaker tailings between the jetties.</td>
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<td>sub-account score</td>
<td>5</td>
<td>0.00 0 9 9 9 9 9 9 9 9 9 0 0</td>
<td>0</td>
<td>ND</td>
<td>The lower the final landform is in the landscape, the greater the aesthetic value was perceived to be, option 1 being the lowest (and most variable) and option 3b being the highest (with the straightest profile).</td>
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<td></td>
<td>degree of long term interaction (diversions and dama)</td>
<td>7</td>
<td>8 0 0 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9</td>
<td>0</td>
<td>ND</td>
<td>While all options are likely to have some degree of interaction to ensure diversions and dama are maintained, Options 1 and 2 was likely to have slightly higher requirements over the long term, the internal drainage system in these options is likely to need more maintenance than the external drainage in Options 3a through 3c.</td>
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<td>sub-account score</td>
<td>5</td>
<td>0.00 0 9 9 9 9 9 9 9 9 9 0 0</td>
<td>0</td>
<td>ND</td>
<td>The lowered final landform is in the landscape, the greater the aesthetic value was perceived to be, option 1 being the lowest (and most variable) and option 3b being the highest (with the straightest profile).</td>
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<td></td>
<td>degree of aesthetic value</td>
<td>4</td>
<td>4 9 8 8 8 8 7 8 9 9 9 9</td>
<td>8</td>
<td>ND</td>
<td>While all options are likely to have some degree of interaction to ensure diversions and dama are maintained, Options 1 and 2 was likely to have slightly higher requirements over the long term, the internal drainage system in these options is likely to need more maintenance than the external drainage in Options 3a through 3c.</td>
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<td>sub-account score</td>
<td>9</td>
<td>0 0 8 0 0 8 0 0 8 0 0 8 0 0</td>
<td>0</td>
<td>ND</td>
<td>The lowered final landform is in the landscape, the greater the aesthetic value was perceived to be, option 1 being the lowest (and most variable) and option 3b being the highest (with the straightest profile).</td>
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<td>Closure reclamation account score</td>
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<td>7.31 7.31 6.55 8.40 8.53</td>
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<td>ND</td>
<td>Includes the costs of the east dam and railroad dam in every option, Options 3a through 3c are higher due to the cost of the higher roads and pipelines.</td>
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<td>Project Economics</td>
<td>9</td>
<td>9 9 9 5 5 5 7 7 7 7 7 7</td>
<td>18</td>
<td>ND</td>
<td>Includes the costs of constructing jetties higher than those options without, longer operating periods, costs in Options 3a through 3c are higher due to the cost of the higher roads and pipelines.</td>
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<td>Capital costs</td>
<td>9</td>
<td>9 9 9 5 5 5 7 7 7 7 7 7</td>
<td>18</td>
<td>ND</td>
<td>The safety of wildlife is likely fairly similar across the options in the long term. Options 1 was slightly down-rated because of the greater anticipation of ponded area and weaker tailings between the jetties.</td>
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<td>Operating costs</td>
<td>9</td>
<td>9 9 9 5 5 5 7 7 7 7 7 7</td>
<td>18</td>
<td>ND</td>
<td>Related to surface area (all very similar) and the time in which reclamation could start.</td>
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<td>Reclamation costs (including levies)</td>
<td>9</td>
<td>9 9 9 5 5 5 7 7 7 7 7 7</td>
<td>18</td>
<td>ND</td>
<td>Related to surface area (all very similar) and the time in which reclamation could start.</td>
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<td>Long term maintenance costs</td>
<td>9</td>
<td>9 9 9 5 5 5 7 7 7 7 7 7</td>
<td>18</td>
<td>ND</td>
<td>Related to surface area (all very similar) and the time in which reclamation could start.</td>
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<td>sub-account score</td>
<td>9</td>
<td>7.26 8.63 7.85 7.85 7.85</td>
<td>0</td>
<td>ND</td>
<td>Includes the costs of constructing jetties higher than those options without, longer operating periods, costs in Options 3a through 3c are higher due to the cost of the higher roads and pipelines.</td>
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<td>Project economics account score</td>
<td>9</td>
<td>7.26 8.63 7.85 7.85 7.85</td>
<td>0</td>
<td>ND</td>
<td>Includes the costs of constructing jetties higher than those options without, longer operating periods, costs in Options 3a through 3c are higher due to the cost of the higher roads and pipelines.</td>
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<td>combined MAA score</td>
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<td>0</td>
<td>ND</td>
<td>Includes the costs of constructing jetties higher than those options without, longer operating periods, costs in Options 3a through 3c are higher due to the cost of the higher roads and pipelines.</td>
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</tbody>
</table>

**Notes:**
- W = weight (scale of 1 to 9 with 9 being the most 'weighty' or most important)
- Level of Confidence valued as high (H), medium (M) or low (L) to describe confidence in the assessment of the particular indicator
- Discrimination value provides the difference between the maximum and minimum weighted scalar values within an indicator
- D = discriminating (i.e., greater than or equal to a 30% difference between the maximum and minimum weighted scalar values within an indicator)
- ND = non-discriminating (i.e., less than a 30% difference between the maximum and minimum weighted scalar values within an indicator)