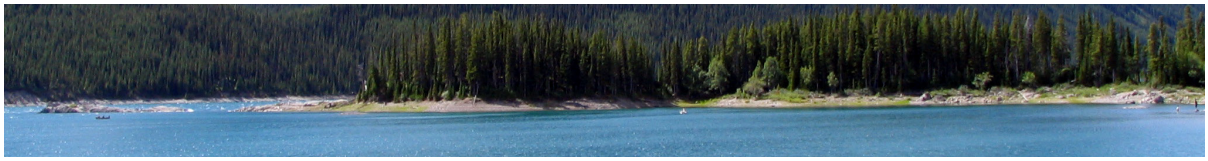
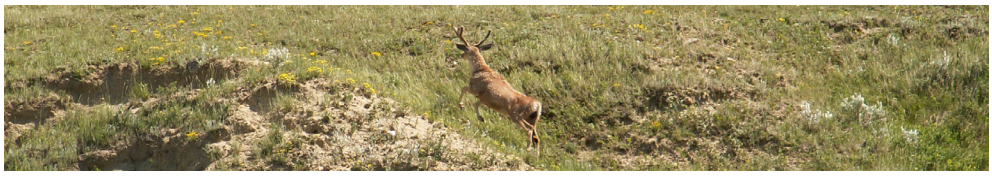
Implementing a World Class Environmental Monitoring, Evaluation and Reporting System for Alberta

Report of the Working Group on Environmental Monitoring, Evaluation and Reporting

June 2012





AEMWG Alberta Environmental Monitoring Working Group

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The Honourable Diana McQueen
Minister
Alberta Environment and Sustainable Resource Development
#425 Legislature Building
10800 - 97 Avenue
Edmonton, Alberta T5K 2B6

30 June 2012

Dear Minister McQueen:

The Alberta Working Group on Environmental Monitoring, Evaluation and Reporting has concluded its work and is pleased to present this Final Report with conclusions and recommendations.

In the course of our deliberations, the Working Group reviewed the prior work of the Alberta Environmental Monitoring Panel (AEMP), and discussed structural and governance options, as well as funding models, with external stakeholders including industry operators, aboriginal groups, scientists and academic leaders, and experts in the field of structure, governance and funding.

The Working Group carefully assessed prior and existing approaches to regional-scale monitoring programs within Alberta and internationally, to understand and extract lessons on best practices. We reviewed potential organizational models and considered how each could achieve the stated goals and objectives of a world class environmental monitoring, evaluation and reporting system in Alberta. Our work, combined with the results of consultations undertaken by your department following the release of the AEMP 2011 report, demonstrate a strong consensus among Albertans for the need to establish an arm's length public monitoring agency with sustainable funding.

We view the implementation of an Alberta Environmental Monitoring system (the AEM system) as an opportunity for Alberta to improve its scientific understanding of environmental effects while achieving greater coordination between governments. An AEM system could catalyze investments in innovative environmental monitoring technology and data management, and realize cost and operating efficiencies. The implementation of an AEM system would not only aid decision-makers, investors and industry, it would also contribute to the growth and diversification of Alberta's technology and information management sectors.

It is our recommendation that the Lower Athabasca region, which has received national and international attention, serve as the pilot project for a province-wide environmental monitoring, evaluation and reporting system. This report includes specific recommendations for the implementation and funding of an AEM system in the Lower Athabasca region.

The members and staff of the Working Group thank you for the opportunity to serve Alberta and we look forward to discussing our Final Report with you at your convenience.

Sincerely,

Original signed
Ernie Hui, P.Eng.

Original signed
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Original signed
Neil McCrank, Q.C., P.Eng.

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Gregory Taylor, Ph.D.

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Original signed
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Chair

Implementing a World Class Environmental Monitoring, Evaluation and Reporting System for Alberta

Report of the Working Group on Environmental Monitoring, Evaluation and Reporting

June 2012

AEMWG Alberta Environmental Monitoring Working Group

Executive Summary

On 13 March 2012, the Minister of Environment and Sustainable Resource Development (ESRD) announced the formation of the Alberta Environmental Monitoring Working Group (Working Group) that was tasked to: "... provide expert advice, viable options and recommendations... in deciding the future governance and funding of a new provincial monitoring, evaluation and reporting system". The Working Group was directed to report by 30 June 2012 with "... recommendations and other relevant advice that outlines and assesses governance options ranging from an arm's length public agency to a structure internal to the Government of Alberta." The Working Group was also directed to "... indicate options, recommendations and implications of sustainable funding mechanisms and budgetary accountability ..." for each governance option.

The 2011 report of the Alberta Environmental Monitoring Panel (AEMP) envisioned a new Alberta Environmental Monitoring, Evaluation and Reporting system (which we will hereafter call the AEM system) that provides "...accurate, trustworthy and useful data and information to inform the work of policymakers, regulators, research organizations and others, through the design, execution and supervision of environmental monitoring programs for air, land, water and biodiversity."

The Public Interest in Monitoring

Rising national and international demand for hydrocarbon products has attracted international investment to Alberta. As a politically secure jurisdiction and stable energy producer, the province has undergone sustained economic growth and development. While national and international interests have focussed on the existing and potential effects of resource extraction in the Lower Athabasca and Cold Lake regions of Alberta, many rural and urban areas throughout the province are also experiencing rapid population and economic development. Perhaps not surprisingly, this has many concerned about broader aspects of environmental integrity and quality. In short, the economic development of Alberta intersects with issues relating to economics, capital investments, and broad social and environmental matters that have risen to the level of national and indeed international importance.

Today's electronic information landscape is one in which environmental practices are scrutinized and debated worldwide. This has important implications for how governments approach resource management and environmental monitoring. Recent public policy debates remind us that we are vulnerable to perceptions that extend beyond our provincial boundaries, however valid or invalid they may be. An essential asset is Alberta's credibility and reputation, which must be constantly earned. Economic realities and a rapidly evolving information landscape provide a sense of urgency and necessity for the development of a world class environmental monitoring, evaluation and reporting system for Alberta.

What Was Done

Following completion of the AEMP 2011 report (30 June 2011), a consultation process undertaken by ESRD with municipal, provincial, aboriginal and industry groups re-confirmed the widespread public belief, that in order to achieve a world class monitoring, evaluation and reporting system, there was a need to create an environmental monitoring agency that was "... science-driven, arm's length, and operationally excellent...".

The Working Group deemed that additional consultations were necessary and chose to discuss structural and governance options and funding models with stakeholders including industry operators, aboriginal groups, scientists and academic leaders, senior government officials and experts in the field of structure, governance and funding.

The Working Group was asked to evaluate organizational options for the monitoring agency, ranging from an arm's length public agency to an 'internal' agency nested within the Government of Alberta. The Working Group assessed the challenges associated with delivering both an arm's length model and an internal to government model.

What the Working Group Considered

The Government of Alberta owns the resource, establishes planning frameworks for management, develops policies and regulations for use, grants approvals, enforces regulations, derives financial benefit, and is responsible for assessing and mitigating environmental impacts. Separation of the mandate for management, policy development, regulation, enforcement, and environmental protection from that of environmental monitoring would shield government from both real and perceived conflicts of interest.

The Working Group noted that Alberta's current approach to environmental effects monitoring is not well coordinated or integrated and would benefit from a more rigorous scientific foundation. As stated in the AEMP 2011 report, monitoring networks operated throughout the province by industrial, municipal, provincial and federal interests fall short of providing the cumulative effects monitoring required to understand and manage environmental impacts over the longer term. Existing monitoring networks are generally sub-optimal and can be duplicative. Collectively they are neither cost-effective nor do they constitute world class science.

The Working Group agreed with the sentiment expressed in the AEMP 2011 report that Alberta needs to design and implement a new, cost-effective approach to environmental monitoring, evaluation and reporting. Decision-makers urgently require enhanced tools to meet growing expectations for responsible management of existing and future economic developments. Albertans must be assured that management and enforcement decisions that shape the scale and rate of resource developments are made by well-informed, skilled managers who are working to ensure that the high provincial goals set for environmental management and protection are, indeed, achieved. There is a sentiment expressed by many that questions the resolve of the Government of Alberta to deliver on its prior public commitments and reinforces the need to be bold in an effort to

build credibility. This will be true whether the new environmental monitoring, evaluation and reporting system operates as an arm's length public agency or as a structure internal to the Government of Alberta.

The Province of Alberta recently implemented a Land Use Framework that delineates seven distinct regions. The Land Use Framework provides a natural architecture for the implementation of a phased, province-wide monitoring system.

The ultimate success of the AEM system will be determined by its ability to meet expectations that it actually be, and be seen to be, science-based, neutral and arm's length from industry and government, as well as expectations that it provide timely, open and accessible information. Meeting these expectations will require a long-term commitment of funding to support a science-based program commensurate with the AEM system mandate.

Albertans need to have confidence that regulators, policy and decision-makers, in governments and industry, are basing their decisions for resource management on sound information. A world class, science-based, monitoring evaluation and reporting system is essential if these basic needs are to be met. Albertans also want a balanced, responsive and inclusive AEM system that achieves cost-effectiveness by enhancing intergovernmental and industrial coordination and provides enhanced and open access to timely and relevant environmental information. While these should be our primary goals, we should not lose sight of the fact that such a system will also provide opportunities for Alberta innovators and researchers to develop world class monitoring and information management technologies with potential global applications. As such, implementation an AEM system need not be viewed as simply a direct cost, but as a potential investment in the development of innovative Alberta technologies with world-wide applications.

The Alberta Chamber of Resources[1] described the achievement of orderly and responsible development as a major issue that will remain front and centre as large natural resource projects drive prosperity in Alberta and Canada. Alberta has an opportunity to be at the forefront of establishing world standards for resource management, but needs to be bold in demonstrating its commitment to delivering, and acting upon factual, timely and relevant information.

What the Working Group Concluded

The Working Group concluded that several key factors should drive the structure and governance of the new AEM system. First and foremost, the new system must respect the principles of legitimacy, credibility, relevance and operational excellence. Importantly, the choice of governance and organizational model may well drive the organization's ability to deliver on these principles. Second, stakeholder expectations are important considerations in selecting the governance and organizational model. Indeed, the Working Group concluded that the interests of stakeholders must be addressed or the AEM system will probably not succeed.

[1] Alberta Chamber of Resources. 2011. Task Force on Resource Development & the Economy. 111 pp.

The Working Group concluded that the arm's length model best meets the critical tests of legitimacy, credibility and stakeholder support.

Should Alberta choose to implement an AEM system internal to government, it would need to create a new department of environmental monitoring, evaluation and reporting, separate from the regulatory or policy operations of government. Such a department would still require substantive new funding and management resources.

The proposed AEM system is expected to deliver high quality environmental monitoring, evaluation and reporting, first in the Lower Athabasca region and subsequently across all regions of Alberta. Expanded baseline monitoring and effects monitoring programs must be designed and implemented, using advanced scientific protocols and methodologies. World class scientific input is needed to develop better methods of analysis and a deeper understanding of uncertain environmental impacts over long periods of time.

A great deal of work will be required to implement the new AEM system, regardless of the organizational model selected. A clear and strong statement by the Government of Alberta about its intentions is necessary to recruit the leadership team, provide them with the political support they require and ensure that potential players and partners are working towards the same outcome. The new AEM system will develop and evolve over several years; the time to begin is now.

Although the Working Group considered the arm's length model to have a higher probability of success, there can be no absolute guarantees with either of the selected governance and organizational models. The Working Group acknowledges an important component required to achieve this goal will be the capable work, and determination, of scientists and managers who will be accorded the responsibility to *'make it work.'* Success will depend on a sustained commitment by government, scientists and the interested or affected publics to achieve a world class AEM system for Alberta.

Needless to say, a world class AEM system will require appropriate funding. The Working Group concluded that five general principles should guide the establishment of a viable funding model for the AEM system:

- AEM funding must be sufficient to support a science-based program commensurate with its mandate.
- AEM funding must be predicable, stable and sustainable.
- The AEM funding model should strive to achieve economic efficiency.
- The AEM funding model should be fair and equitable.
- The funding model should be administratively simple and cost effective.

Consistent, long-term funding is crucial to the success of the AEM system. Current controversies are a consequence of underfunding for environmental monitoring, evaluation and reporting. Environmental monitoring has not kept pace with development. The value of a world class AEM system will require the consistent and reliable collection,

evaluation and reporting of data and information over periods *measured in decades* rather than months or years. Alberta's investment in long-term environmental monitoring, evaluation and reporting must be sustained through commodity price and economic cycles.

The Working Group concluded that the implementation of the AEM system should follow a phased approach starting with the Lower Athabasca region and thereafter expanding to all seven Alberta land use regions. This approach would allow for the recruitment of a management team, the establishment of a corporate office and the appointment of Governance and Science Advisory Boards. Key governance, organizational roles, working priorities and procedures could then be progressively established.

The organization would gain experience and build credibility that would facilitate development of the province-wide AEM system. The credibility and trustworthiness of the AEM system will be crucial to national and international confidence in Alberta's management of its natural resources, enhancing its social license to both manage and regulate its resources, all of which are of vital economic and strategic importance to the Province and Canada.

The proposed AEM system is expected to deliver high quality environmental monitoring, evaluation and reporting, first in the Lower Athabasca region and subsequently across all regions of Alberta. Expanded baseline monitoring and effects monitoring programs must be designed and implemented, using advanced scientific protocols and methodologies. World class scientific input is needed to develop better methods of analysis and a deeper understanding of uncertain environmental impacts over long periods of time.

What the Working Group Recommends

Recommendation 1: Mandate of the AEM System

The Working Group recommends that the AEM system have a clear mandate to:

- undertake field monitoring, data evaluation and reporting of environmental conditions, including baseline monitoring and effects monitoring in all regions of Alberta;
- deliver all aspects of baseline and effects monitoring, whether field activities are conducted by the AEM system or by other entities acting for the AEM system. The quality and efficiency of all monitoring programs would be the responsibility of the AEM system;
- assume direct responsibility for regional baseline and effects monitoring programs currently carried out by industry or by stakeholder organizations, where the AEM system could improve the quality and effectiveness of those programs;
- support management and analysis of compliance monitoring data, but not regulatory enforcement;
- participate in scientific research to better understand the environmental effects of human activity;
- promote the advancement of environmental monitoring techniques and practices;

- inform discussion around economic development and the environment, by providing factual evidence and increasing our knowledge of environmental effects; and
- establish the AEM system as a world class environmental monitoring organization.

Recommendation 2: An Integrated and Focused AEM System

The Working Group recommends the AEM system be established as a highly focused, single purpose, scientific monitoring organization, capable of designing and implementing environmental monitoring, evaluation and reporting programs in all regions of Alberta, whether the AEM system is internal to government or at arm's length.

Recommendation 3: Values and Principles

The Working Group recommends careful consideration of four values and principles when selecting a governance model for the AEM system:

- **Legitimacy:** The AEM system must be seen as legitimate in the eyes of many stakeholders. It must respect stakeholder values and be fair in its treatment of opposing views and interests. A clear separation of environmental monitoring from the policy development and regulatory functions of government is essential.
- **Credibility:** Science must drive the design and execution of AEM programs. Data and information provided by the AEM system must be seen as scientifically sound, free of bias or perceived bias, and uncontrolled by any stakeholders.
- **Relevance:** Information provided by the AEM system must meet the needs of many stakeholders. The AEM organization must have a clear commitment to communicating with stakeholders and responding to their needs.
- **Operational Excellence:** The AEM system must demonstrate excellence in environmental monitoring, and deliver the best possible information in a timely, efficient and accountable manner.

Recommendation 4: Stakeholder Expectations

The Working Group recommends that careful attention be paid to the expectations of stakeholders when selecting a governance model for the AEM system. Stakeholders with a particular interest in governance of the AEM system include the scientific and academic communities, industrial operators, service sectors, aboriginal communities, environmental advocates and the Government of Alberta.

Recommendation 5: An Arm's Length Agency

The Working Group recommends the AEM system be established as an arm's length agency, with a clear mandate, strong governance, strong leadership and a clear commitment to scientific monitoring. An arm's length structure with strong governance will most likely satisfy the key principles of legitimacy and credibility.

Recommendation 6: Funding Principles

The Working Group recommends that AEM funding be commensurate with its mandate, supporting best in class environmental monitoring, evaluation and reporting in all regions of Alberta. Funding must be stable and sustainable over time. Funding mechanisms must be economically efficient, equitable and administratively cost effective.

Recommendation 7: Funding Mechanisms

The Working Group recommends that funding for the AEM system be collected from large point-source emitters and from the general public. Funding from large emitters could be collected through levies on energy production, energy development, water consumption, hydrocarbon combustion and GHG emissions. Funding from the general public could be collected from levies on water consumption, fuel consumption, a broad sustainability tax and through the General Revenue Fund.

Recommendation 8: Flow of Funds

The Working Group recommends that all funding be collected by the Government of Alberta and dedicated to the AEM system, to avoid any perception that AEM activities are directly funded by interested parties. Funding for all environmental effects monitoring and research programs should flow through the AEM system to ensure that third party activities are well managed and focused on AEM objectives.

Recommendation 9: Phased Implementation by Region

The Working Group recommends that initial funding of the AEM system be focused on improving monitoring programs in the Lower Athabasca region. The Lower Athabasca should serve as a first step, or pilot project, for the province-wide AEM system.

Recommendation 10: Launching the AEM Organization

The Working Group recommends that funds be provided immediately to launch the AEM organization, including the formation of the Governance and Science Advisory Boards.

Recommendation 11: Phased Implementation of an Arm's Length Model

The Working Group recommends that an arm's length AEM system be established in three phases over a five year period:

- Lower Athabasca monitoring programs and the new agency would be initiated on parallel paths during Phase 1.
- Lower Athabasca programs would transition from ESRD to the new agency in Phase 2.
- Province-wide programs, full operational excellence and scientific credibility would be established in Phase 3.

Recommendation 12: Alberta-Canada Coordination and Cooperation

The Working Group recommends the AEM system lead and manage all environmental monitoring programs in the Lower Athabasca region.

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1 Introduction

The Alberta Environmental Monitoring Panel submitted its final report (AEMP 2011 report)[2] to the Minister of Environment on 30 June 2011, recommending establishment of a world class environmental monitoring, evaluation and reporting system for all regions of Alberta. A key recommendation was the creation of the Alberta Environmental Monitoring Commission to operate at arm's length from government, regulators and those being regulated.

On 13 March 2012, the Minister of Environment and Sustainable Resource Development (ESRD) announced the formation of the Alberta Environmental Monitoring Working Group (the Working Group) that was tasked to: "... provide expert advice, viable options and recommendations... in deciding the future governance and funding of a new provincial monitoring, evaluation and reporting system" (Terms of Reference, Appendix A). The Working Group was directed to report by 30 June 2012 with: "... recommendations and other relevant advice that outlines and assesses governance options ranging from an arm's length public agency to a structure internal to the Government of Alberta." The Working Group was also directed to "... indicate options, recommendations and implications of sustainable funding mechanisms and budgetary accountability ..." for each governance option.

- The Working Group commenced its work by first reviewing the AEMP 2011 report and the recommendations of that report (Appendix B). In summary, the AEMP 2011 report recommended that:
- comprehensive environmental monitoring, evaluation and reporting be established as a pillar of Alberta's natural resource management framework, alongside regional land use planning, an enhanced energy regulatory process and cumulative environmental effects management;
- a province-wide system be organized on a regional basis, aligning with the boundaries of the Alberta Land Use Framework, to provide timely and useful information to government, regulators, industry, researchers, stakeholders and the public;
- traditional environmental knowledge be respected and used by the Commission, and that aboriginal communities participate in Commission activities, including community-based monitoring programs;
- mechanisms be established to encourage and facilitate stakeholder input to the regional monitoring programs, as well as at the provincial level;
- Alberta establish the Alberta Environmental Monitoring Commission as a science-driven, arm's length and operationally excellent public agency, to deliver baseline monitoring, effects monitoring and state of the environment monitoring in all regions of Alberta; and

[2] A World Class Environmental Monitoring, Evaluation and Reporting System for Alberta - The Report of the Alberta Environmental Monitoring Panel, June 2011.

- the Commission be established with sufficient authority and resources to conduct world class environmental monitoring, evaluation and reporting. The Commission be governed by an appointed Board and be advised by an appointed Science Advisory Panel.

The Government of Alberta considered that two recommendations in the AEMP 2011 report represented major policy shifts, and would require further analysis and review before implementation. These recommendations included:

- establishing an arm's length public agency with enough authority and resources to lead and carry out environmental monitoring, evaluation and reporting in Alberta; and
- providing a dedicated, stable revenue stream to fund monitoring, evaluation and reporting.

The Working Group was directed to provide further advice to help the Minister understand the possible implications of these recommendations, and to identify options to achieve the intended outcomes.

Alberta is not satisfied to meet minimum standards: the recommendations of the AEMP 2011 report would elevate Alberta's environmental monitoring practices to best in class, as measured by world class standards.

1.1 AEM Mission Statement

Shortcomings in Alberta's environmental management practices are not unique; indeed, similar shortcomings would be found in most regions and jurisdictions of North America and internationally. Alberta is not satisfied to meet minimum standards: the recommendations of the AEMP 2011 report would elevate Alberta's environmental monitoring practices to best in class, as measured by world class standards.

The Working Group reviewed the mission statement presented in the AEMP 2011 report. The proposed Alberta Environmental Monitoring system (AEM system) will:

> "...provide accurate, trustworthy and useful data and information to inform the work of policymakers, regulators, research organizations and others, through the design, execution and supervision of environmental monitoring programs for air, land, water and biodiversity."

The Working Group considers this mission statement to be as relevant and appropriate today as it was in 2011.

1.2 AEM Mandate Statement

To fulfill its mission statement, the AEM system requires a clear and purposeful mandate statement: what must the organization do to deliver its mission and satisfy its sponsors and stakeholders?

The Working Group referred to Section 2.2 of the AEMP 2011 report for a definition of environmental monitoring, evaluation and reporting:

> "A robust and trustworthy environmental monitoring system consists of three distinct components: monitoring, evaluation and reporting. Monitoring by itself is not sufficient. Integration of these components is essential for Alberta to manage development while maintaining a high standard of environmental stewardship. This section expands on the three components and describes the important role played by science in environmental monitoring.
>
> "Monitoring" uses a variety of techniques to sample air, water, soil, vegetation, fish and wildlife. The resulting data enable us to assess current environmental conditions and detect changes or trends. These data also enable analysis of the pressures that influence environmental conditions and the impact of management actions that are taken to correct or improve these conditions. Monitoring data are a cornerstone of a system that enables us to build environmental knowledge and assess environmental performance. A dynamic monitoring system has feedback loops that enable us to also monitor whether management actions are having the desired effect.
>
> "Evaluation" involves assessing the monitoring data to determine what is happening to the environment and why. Integrated environmental assessments require scientific expertise from a variety of disciplines. Evaluation seeks to determine the existence and significance of relationships between emissions to and disturbances of the environment and the impacts those emissions and disturbances may be having on the environment. Cause-and-effect relationships are often complex and evaluation activities must take into account uncertainties in order to reveal problems that must be addressed. Evaluation work can also serve to refute environmental concerns where there is little or no cause and effect. The evaluation process can be extremely challenging scientifically and requires careful integration of scientific insight, statistical analysis, treatment of uncertainty, and process-based modeling. Monitoring data are needed across a range of spatial scales to support innovative analysis.
>
> "Reporting" is the dissemination and publication of monitoring data and evaluation results to a variety of audiences. Environmental reports will inform governments, regulators, industrial operators, researchers and the public. Reporting promotes understanding of existing conditions, trends and potential risks; the pressures that affect these conditions; and potential management responses to reduce pressures and improve conditions. A key objective of environmental reporting is to communicate information that supports policy development and informs environmental management decision making."

Considering this definition, the Working Group proposes the following mandate statement for the AEM system:

Recommendation 1:

Mandate of the AEM System

The Working Group recommends that the AEM system have a clear mandate to:

- undertake field monitoring, data evaluation and reporting of environmental conditions, including baseline monitoring and effects monitoring in all regions of Alberta;
- deliver all aspects of baseline and effects monitoring, whether field activities are conducted by the AEM system or by other entities acting for the AEM system. The quality and efficiency of all monitoring programs would be the responsibility of the AEM system;
- assume direct responsibility for regional baseline and effects monitoring programs currently carried out by industry or by stakeholder organizations, where the AEM system could improve the quality and effectiveness of those programs;
- support management and analysis of compliance monitoring data, but not regulatory enforcement;
- participate in scientific research to better understand the environmental effects of human activity;
- promote the advancement of environmental monitoring techniques and practices;
- inform discussion around economic development and the environment, by providing factual evidence and increasing our knowledge of environmental effects; and
- establish the AEM system as a world class environmental monitoring organization.

1.3 Organizational Options Considered

The Working Group considered a number of options regarding the structure and governance of an AEM system. Should environmental monitoring be conducted by multiple units dispersed throughout the Alberta government? Should it be contracted out to multiple service providers? Should the government create a focused department within the government? Or should environmental monitoring be conducted by a new government agency?

It is critical that the AEM system be structured as a highly focused organization with full responsibility for environmental monitoring in Alberta.

The Working Group quickly dismissed the two dispersed models. Whether external to government or within the bureaucracy, it is critical that the AEM system be structured as a highly focused organization with full responsibility for environmental monitoring in Alberta.

Recommendation 2:

An Integrated and Focused AEM System

The Working Group recommends the AEM system be established as a highly focused, single purpose, scientific monitoring organization, capable of designing and implementing environmental monitoring, evaluation and reporting programs in all regions of Alberta, whether the AEM system is internal to government or at arm's length.

With the foregoing mission and mandate statements in mind, the working group undertook assessments of two organizational models:

- an arm's length public agency, as recommended in the AEMP 2011 report; and
- an internal to government department.

Ultimately, the acceptance and success of either model will depend on a sustained commitment by government, scientists, team leaders, employees and stakeholders to achieve a world class AEM system for Alberta.

The strengths and weaknesses of these two organizational models are examined in the balance of this report.

1.4 Political, Economic and Social Context

In the year since the AEMP 2011 report was submitted to the Government of Alberta, local, regional, national and world events have affected the political, economic and social landscape in which a world class environmental monitoring, evaluation and reporting system for Alberta would operate. The Working Group considered three aspects of this landscape to be particularly relevant:

- an evolving information landscape, and the role it plays in the province's reputation, including its perceived social license to regulate and control resource developments;
- the pace of population and economic growth within Alberta; and
- Alberta's role in orderly and responsible energy development.

1.4.1 A New Information Landscape

In developing our recommendations, the Working Group was cognizant of the rising impact of mobile communications and social media on global thought and action. The adage '*information is power*' is certainly relevant today. However, the Working Group believes a more current adage might be '*information is empowering*'. Mobile technologies have changed the world in which we live. It is a world in which media can no longer be managed or controlled. As described by Ed Thompson[3], "the media that exists today lies in the hands of four billion mobile phone users – essentially a public information space".

[3] http://www.freshnetworks.com/blog/2011/12/information-is-power-the-compression-of-world-events-through-social-and-mobile/.

There are many implications of this new information landscape. The first is the extent to which new sources of information are mobilized to augment traditional sources. These new sources come in different forms. The WikiLeaks[4] phenomenon is a powerful reminder that private or classified media from anonymous sources has become a daily part of social media. Incomplete or ill-advised messages in conventional media can also mobilize a world of agents, whose creativity, ingenuity and resolve are difficult to predict. Collectively they assemble a powerful intellect that can undermine efforts to limit the availability of information, massage data, or spin messages. Social sources of information can also appear and spread rapidly before information is released by governments or institutions. A worst case scenario arises when a vacuum in factual information is filled by popular myth or outright untruths. The resulting effect on credibility and reputation can be difficult to repair. Full, timely and open disclosure becomes a major asset. The old idiom, honesty is the best policy, has perhaps become more true today than ever before.

A second implication of the new information landscape is that it builds people's perceptions of the power of a proletariat. It provides a vehicle to confirm one's views and translate them into action. Recent political events in Tunisia, Egypt and Libya, in which social media venues such as Facebook and Twitter played an important role, demonstrate how significant this can be. One commentator noted: "The barricades today do not bristle with bayonets and rifles, but with phones"[5].

A third implication is that news of interest is not simply restricted to events of the day. It also includes perceptions of events and perceptions of how others respond to these events. This generates a new accountability that can play out on the world stage.

On the issue of accountability, Nick Gowing of the Guardian has been particularly eloquent. "New lightweight technologies available to almost anyone mean a new capacity for instant scrutiny and accountability that is way beyond the narrower, assumed power and influence of the traditional media". These new technologies are "driving a wave of democratisation and accountability" that "shifts and redefines the nature of power". They also create "a new policy vulnerability and brittleness for institutions, who then struggle even harder to maintain public confidence". "Most major institutions ... still don't appreciate the full scale and implications of the dramatic new real-time media trend and its profound new impact on their credibility"[6].

Recently the Hill Times[7] reported that 59% of Canadians believe the government has put the interests of oil and gas companies above those of Canadians. Only 15% agreed that Prime Minister Stephen Harper was putting the interests of Canadians over those of oil and gas companies. In addition, the poll found that 63 percent of Canadians do not trust the government to do what's best for Canada with the environment.[8]

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4 http://wikileaks.org/.

5 http://www.smh.com.au/technology/technology-news/can-social-networking-overthrow-a-government-20110225-1b7u6.html.

6 http://www.guardian.co.uk/commentisfree/2009/may/11/real-time-media-government.

7 Hill Times 30 April 2012 Forum Research.

8 The survey is accurate 2.4 percent 19 times out of 20.

There are messages here that the Government of Alberta would be wise to consider. Questions concerning the legitimacy of social license have not traditionally been the purview of democratic governments, perhaps because they test their license periodically through the electoral process. With elections behind them, governments turn to develop public policy that delivers value to their constituency. In the past, development of policy has tended to be largely parochial in nature and involved efforts to manipulate variables that could be easily controlled through legislation.

Things, and times, have changed. Today environmental policies are scrutinized worldwide. Their effectiveness not only defines the quality of the environment in which we live, but may affect Alberta's ability to access markets for resources that are the foundation of our provincial economy. Recent debate surrounding the EU Clean Fuel Directive and the proposed Keystone XL pipeline reminds us that we are vulnerable to perceptions that extend beyond our provincial boundaries, however valid or invalid they may be. An essential asset is Alberta's credibility and reputation, which must be constantly earned.

Today environmental policies are scrutinized worldwide.

Given Alberta's place on the world stage, we have to be at the forefront of establishing world standards to satisfy Albertan's, and our commercial markets. Trust is hard to gain and even harder to regain once it is lost. Alberta needs to be bold in demonstrating our commitment to delivering, and acting upon factual, timely and relevant information in the regulation of resource management.

1.4.2 Managing Growth in Alberta

Alberta has the ultimate responsibility for managing a continuing series of challenges related to the rapid development of its natural resources and commensurate population growth. These challenges include, but are not restricted to those arising from development of the oil sands. Although little reported, or perhaps understood, population and urban growth pose as much risk and stress to Alberta's ecosystems as certain resource extraction projects.

Statistics Canada (2012)[9] reported Alberta grew from a population of 73,022 in 1901 to over 3.6 million in 2011, representing a proportional growth from approximately 1.5% to 10.9% of Canada's population. Alberta Finance and Enterprise[10] projects that Alberta's population will continue to grow through 2050 to between 5.0 to 7.5 million, driven by international migration. Alberta's growing population has steadily become more urbanized, with approximately 81% of Albertans now living in urban areas. The Calgary-Edmonton corridor is the most urbanized area in Alberta and is one of Canada's four most urban regions.

[9] Statistics Canada. 2012. Population and dwelling counts for Canada, provinces and territories. 2006-2001 censuses. http.//www12.statscan.gc.ca/census.

[10] Alberta Finance & Enterprise (2011). Alberta Population Projections 2011-2050 by Census Division. 50 pp.

Alberta's world-scale energy resources have attracted attention far beyond our provincial boundaries. Current developments in the oil and gas sector are of national and international importance. Issues associated with other industries including forestry, mining, transportation and agriculture, together with the rate and extent of urban development may not receive the same level of international attention, but are nonetheless significant to Albertans and our environment.

1.4.3 Orderly and Responsible Development

Alberta has secured its place as an energy supplier of global significance. Global oil consumption has risen to nearly 90 million barrels per day, and the International Energy Agency estimates that global demand for energy will grow by almost 50% by 2035[11]. Canada is a significant and growing supplier to world markets, with continuing plans for oil sands development.

> "Canada and Alberta depend heavily on the resource sectors as key or propulsive economic drivers. Rather than being a declining source of wealth generation, these sectors - particularly with growth of the oil and gas components - account for a rising proportion of all tangible wealth in Canada. Over the past decade, on average, the Alberta resource sectors have accounted for 62 percent of provincial GDP. Directly and indirectly, these sectors drive half of all Alberta employment. Furthermore, these economic sectors are technology intensive and have shaped a thriving knowledge economy in Alberta, which has more than 75,000 professional engineers, geoscientists and technologists - one of the highest per capita concentrations in the world".[12]

The Alberta Chamber of Resources[13] has suggested that "orderly and responsible development" will remain a major issue as Alberta's enormous energy resources become increasingly economic in a global marketplace that needs every possible source of energy. The Chamber cites economic models that indicate the resource sector could lead Alberta GDP growth over the next decade with $700 billion in incremental GDP, just under four million person-years of employment and over $110 billion in provincial government revenues. An inventory of capital investment in Alberta shows that 64% of the $209 billion in major projects now underway are attributed to the oil sands sector[14]. Ancillary developments in the commercial and residential sectors contribute a further 4.4% ($9.2 billion). More than two-thirds of major project activity in Alberta is driven by or related to oil sands development.

Currently, Canada exports more than two million barrels per day, largely to the USA. In 2012, the value of Canadian oil exports to the USA reached $50.4 billion – a figure that is approximately equal to the entire Canadian trade surplus with the USA.[15] As international energy demands rise, the pressure to exploit oil sands opportunities will continue to grow.

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11 McCullough, M. February 14, 2012. Canadian Business.
12 Alberta Chamber of Resources. 2011. Task Force on Resource Development & the Economy. 111 pp.
13 Alberta Chamber of Resources. 2011. Task Force on Resource Development & the Economy. 111 pp.
14 Alberta Economic Development. 2011. Inventory of Major Alberta Projects. 4 pp.
15 McCullough, M. February 14, 2012. Canadian Business.

While many policy makers have tended to assume steadily rising prices for Alberta bitumen and heavy oil, past histories and the volatility of the energy commodity marketplace remind us that such assumptions may be optimistic. Oil prices could decline significantly from the current high valuations, something that has occurred frequently in the past decades. In a stressed scenario, high production and construction costs coupled with low oil prices could lead to difficult decisions for energy companies and governments. Annual funding for any long-term environmental monitoring, evaluation and reporting system will have to account for both upside and downside commodity prices. In a low price environment, reduced cash flows and economic returns will slow the pace of energy development and crimp the funding available for a wide range of programs, including environmental monitoring.

Annual funding for any long-term environmental monitoring, evaluation and reporting system will have to account for both upside and downside commodity prices.

Alberta's energy resources and their economic development are of national importance to Canada. These energy and economic realities, a new information landscape and current debate about orderly and responsible development provide a sense of necessity and urgency for the development of a world class environmental monitoring, evaluation and reporting system for Alberta.

2 Factors That Drive the Structure and Governance of an Environmental Monitoring System

The AEMP 2011 report recommended that the Government of Alberta establish the Alberta Environmental Monitoring Commission as a science-driven, arm's length and operationally excellent public agency, to deliver baseline monitoring, effects monitoring and state of the environment monitoring in all regions of Alberta.

In March 2012, the Minister of Environment and Sustainable Resource Development formed the Working Group to re-examine the AEMP recommendations on structure and governance, and to consider organizational options ranging from an arm's length public agency to an internal to government department. The Minister made a number of specific requests:

- Describe the proposed structure and its relationships of authority, consultation, advice or accountability with agencies within the Governments of Canada and Alberta, First Nations and Métis, current monitoring partners and stakeholders, at both provincial and regional levels, including how the structure will affect the oil sands monitoring partnership between the Governments of Canada and Alberta.
- Outline how the organization would achieve operational excellence within its own operations, and in its interactions with other government agencies and a broad range of stakeholders. Outline how the organization would provide for effective management of the monitoring system, including how it addresses the range of monitoring functions conducted by industry and other parties, including regulated compliance monitoring and regional effects monitoring.
- Outline how the option would provide scientific oversight and validation through independent science and a peer review process. Outline how the organization would meet the critical tests of legitimacy and credibility in the eyes of a broad range of stakeholders. Outline how the option would provide accessibility, quality and transparency of data and information.
- Indicate how the monitoring information would contribute to the broader system of natural resource and environmental management.
- Indicate how and by whom decisions relating to allocating scarce resources would be made.

The Working Group considered these issues and discussed structural and governance options with stakeholders including industry operators, energy regulators, aboriginal groups, scientists, academic leaders, Alberta government officials and experts in the fields of organizational structure, management and governance. Finally, the Working Group reviewed the detailed work behind the AEMP 2011 report and discussed structural and governance issues with members of AEMP.

The Working Group considered a number of options regarding the structure and governance of an AEM system and concluded that two models are worthy of further assessment:

- an arm's length public agency, as recommended in the AEMP 2011 report; and
- an internal to government department.

Sections 2.1 through 2.4 discuss the factors the Working Group considered in completing a comparative assessment of these two models. The findings of our comparative assessment are presented in Section 3.

2.1 Values and Principles as Drivers of Structure and Governance

The AEMP 2011 report highlighted the importance of values and principles as drivers of structure and governance and identified legitimacy, credibility, relevance and operational excellence[16] as paramount.

Important questions of principle for the Government of Alberta to consider when selecting an organizational model for the Alberta environmental monitoring system include:

- Which model would deliver environmental monitoring information of the highest scientific legitimacy and credibility?
- Which model would best earn the basic public trust? Would various stakeholder groups respect and trust the work of an arm's length agency? Would those groups respect and trust the work of a government department?
- Which model would deliver environmental monitoring information most relevant to stakeholders?
- Which model would best achieve operational excellence, delivering better information more quickly and in the most cost-effective manner?

2.1.1 Legitimacy

It will be crucial to the success of the AEM system to gain the initial support of the scientific community and the public. This is a function of both legitimacy and credibility.

To be seen as legitimate, the AEM system must be respectful of differing values and aspirations of stakeholders' and treat them fairly in all activities. The AEM system can achieve some legitimacy by ensuring its reporting activities are value neutral, but efforts to achieve legitimacy should be more encompassing. To begin with, the AEM system must develop robust mechanisms for identifying what needs to be measured. All

[16] Cash, D. W., Clark, W., Alcock, F., Dickson, N., Eckley, N., Guston, G., Jäger, J., Mitchell, R. 2003. "Knowledge Systems for Sustainable Development." *Proceedings of the National Academy of Science* 100:8086-8091.

stakeholders should have an equal opportunity for input, and the AEM system must decide on, not be directed to, establishing its annual priorities for monitoring activities.

Clearly separate environmental monitoring, evaluation and reporting, which can and should be value neutral, from the development of policy and regulation, granting of approvals, and implementation of enforcement strategies, which often require value judgements.

Importantly, in establishing an AEM system the government must clearly separate environmental monitoring, evaluation and reporting, which can and should be value neutral, from the development of policy and regulation, granting of approvals, and implementation of enforcement strategies, which often require value judgements. The clear separation of roles and responsibilities is an advantage of the arm's length model; an internal model would be challenged to achieve the same separation of roles and responsibilities.

If the AEM system is established as a working department within the Government of Alberta, can it provide information that is seen as legitimate and trustworthy? Currently the Government of Alberta is responsible for encouraging and facilitating natural resource development. It owns the resources and is a major beneficiary of resource development, through the royalty and tax systems. The Government of Alberta is also the regulator of resource development and the assessor of environmental performance. For many stakeholders, the multiple responsibilities of government carry the perception of a conflict of interest.

These perceptions are not unique to Alberta. Indeed, all governments that establish advisory bodies, scientific or otherwise, will themselves be judged by how they interpret and address conclusions from those bodies. Ultimately, democratically-elected governments bear the burden of public trust and accountability when they attempt to adjudicate matters deemed to be in the public, national or provincial, interest.

The extent to which the organizational model of an AEM system would make a difference to a critical public is unclear. After all, even an agency operating at arm's length is still accountable to the government through a Minister and any government could invoke its powers to adjudicate matters in ways it views as being in the public interest. Nevertheless, having some distance from government's regulatory and economic development activities would unquestionably have a positive influence on public perceptions of legitimacy.

2.1.2 Credibility

The AEMP 2011 report emphasized that science must drive the design and execution of environmental monitoring activities. Sound scientific design and execution will provide accurate and useful data; sound science will also give the AEM system a degree of credibility with scientific experts, stakeholders and the public at large. Establishing credibility, however, requires more than just sound science. Data and information provided by the AEM system must also be seen to be unfettered or to be controlled by any of the different stakeholders, and must be regarded as free from bias or perceived bias; only then will information be trusted.

The AEMP 2011 report recommended an arm's length public agency with strong scientific leadership and strong scientific capabilities, including a science advisory board and scientific representatives on the Governance Board. An arm's length structure was noted as having the highest probability of achieving credibly in the eyes of the scientific community.

What formative steps would an arm's length agency need to take to build credibility within the scientific community? By comparison, what formative steps would an internal to government model need to take to build similar credibility?

Essentially, where legitimacy is an exercise in *"doing the right things"*, credibility is more concerned with *"doing things right"*. In science, the method most commonly used to assess the quality of science is peer review and publication in the scientific literature is a key method of garnering peer review. Other methods include collaborating with peers in joint work and validation through audit or accreditation by external boards or panels of experts. As a science driven organization, the more the AEM system can participate in peer review, encourage publications in refereed scientific journals, and be open to external audit and validation, the more credible will the work become.

Where legitimacy is an exercise in *"doing the right things"*, credibility is more concerned with *"doing things right"*.

If an internal model is established, can it provide information that is seen as credible and trustworthy? Historically, the closer an organization is to government, the more difficult it is to be fully open to peer or external review. The nature of scientific inquiry means that findings, data and conclusions need to be made public for debate, review and critique even when the message is unpopular. In fact, the more controversial the findings are, the more important debate, review and critique become. Such practices may not always align well with the political propensity to manage the message. Even if governments attempt to be transparent and open, either the historical record or current perceptions may colour the perspective of stakeholders receiving the information. Scientific credibility must be consistently maintained and openly nurtured.

Notwithstanding these concerns, there are mechanisms that could build the credibility of the internal to government model. Science advisory panels, joint appointments of staff to universities, in-house publications and staff participation in collaborative ventures with other researchers all work to build credibility. However, only one event where the timing of the release of a finding is altered for what may be viewed as a political purpose – even if it wasn't – would result in a loss of credibility.

While an arm's length model would provide no guarantee of credibility, the Working Group concluded, all other things being equal, that the arm's length model would initially have more credibility and would be more likely to maintain credibility than would the internal model - simply because it is operating at arm's length.

2.1.3 Relevance

To be relevant, the AEM system must understand the needs of all of its stakeholders, it must develop the necessary knowledge base to understand cumulative effects, and it must connect this knowledge to the larger Alberta natural resource management system. Achieving relevance will require strong scientific capabilities and communication skills.

Can such scientific capability and communication skills exist in either an arm's length or internal model? Could either an arm's length or internal model deliver relevant information with the right leadership, structure, human resources and communication mechanisms?

Government is the ultimate authority for coordinating the natural resource management system, and is ultimately accountable to the electorate for decisions the system makes. The closer the various elements of this system are to each other, the more purposefully they can be integrated into an effective resource management system. The internal model would have an advantage in remaining relevant to the other components of the system compared to an arm's length model. However, any government department will be challenged to understand and accommodate the needs of stakeholders outside of government. Often, this external focus is lost as government staff respond to the more immediate needs and priorities of politicians and others within government.

If established as an arm's length organization, integration with other components of the larger resource management system would need to be well designed. The AEMP 2011 report noted that the previous Northern River Basins Study Board (1991-1996) (NRBS) achieved a high degree of stakeholder acceptability in that regard. The NRBS precedent provides some optimism that an arm's length agency could operate as a fully integrated part of a larger government system.

In summary, either alternative could deliver relevant information with the right structure, leadership, financing, human resources, communications and business plan. Each could provide relevant information that would effectively inform critical resource management decisions. On the other hand, if not managed properly, either alternative could also fail to deliver. The Working Group concluded relevance could be met with either option and would not be an important driver of organizational design.

2.1.4 Operational Excellence

Operational excellence requires an organization and management culture that is committed to exceptional performance and embraces continuous improvement.

The AEM system must demonstrate excellence in environmental monitoring, and deliver the best possible information in a timely, efficient and accountable manner. In Alberta, there are good examples of operational excellence attained within government and within arm's length agencies. Either an arm's length or an internal model should be able to achieve operational excellence with the right structure, leadership, human resources and business plan.

Operational excellence is more than measuring and assessing performance. It requires an organization and management culture that is committed to exceptional performance and embraces continuous improvement. This culture must permeate the organization and be evident in all business processes. The organization must strive to do things better, faster and more efficiently.

Alternative governance models differ in their ability to achieve operational excellence. Within a broader government structure, processes needing improvement could fall outside the sphere of influence of an internal department. Furthermore, processes needed to manage a large, multi-functional entity like the Government of Alberta may not serve the specific interests of a science-driven AEM system. Recruitment and retention of highly credible scientists, for example, may not be supported by the highly structured human resource classification system found in governments. Compensation is one issue, but activities like travel and attendance at international symposia are often closely managed events within government. These activities are critical to knowledge development and knowledge exchanges needed to support the credibility of the AEM system.

The Working Group debated whether an internal agency could maintain a strong focus on both dedicated science and operational excellence over the long term and concluded that an internal to government model could encounter challenges. There are examples in Canada, and elsewhere, of government agencies that struggled to attract strong scientific expertise, and respected and productive government research entities that have faced severe budget restrictions as a result of short-term priorities faced by governments of the day.

The Working Group concluded that structure and governance could have a major influence on the achievement of operational excellence. In particular, the Working Group noted that a strong Governance Board would set performance targets and expectations that would keep management focused on achieving operational excellence.

Recommendation 3:

Values and Principles

The Working Group recommends careful consideration of four values and principles when selecting a governance model for the AEM system:

Legitimacy: The AEM system must be seen as legitimate in the eyes of many stakeholders. It must respect stakeholder values and be fair in its treatment of opposing views and interests. A clear separation of environmental monitoring from the policy development and regulatory functions of government is essential.

Credibility: Science must drive the design and execution of AEM programs. Data and information provided by the AEM system must be seen as scientifically sound, free of bias or perceived bias, and uncontrolled by any stakeholders.

Relevance: Information provided by the AEM system must meet the needs of many stakeholders. The AEM organization must have a clear commitment to communicating with stakeholders and responding to their needs.

Operational Excellence: The AEM system must demonstrate excellence in environmental monitoring, and deliver the best possible information in a timely, efficient and accountable manner.

2.2 Stakeholders Expectations as Drivers of Structure and Governance

2.2.1 Who Are the Stakeholders

The AEM system is widely seen as an essential element of environmental management in Alberta, particularly in the oil sands region. Even in this one region there are many stakeholder groups with different objectives and criteria for success. Those stakeholders who will have views on the success or failure of the AEM system include:

- the Government of Alberta, including elected politicians, the civil service and its various departments and agencies;
- municipal governments within Alberta;
- the Government of Canada, including elected politicians, the civil service and various federal departments;
- the scientific and academic communities;
- industries including energy production, energy processing, agriculture and forestry, and associated service sectors;
- the Canadian and international financial sectors, including equity investors, lenders, credit rating agencies and shareholder advisory firms;
- Aboriginal communities;
- Regional communities in all parts of Alberta;
- environmental advocates; and
- others, collectively known as the general public.

2.2.2 Expectations of the Government of Alberta

Environmental monitoring, evaluation and reporting is a major challenge, but the delivery of useful monitoring data and information is just one element of a comprehensive system that crosses department boundaries and includes policy development, permitting, licensing, compliance monitoring, regulation and enforcement. To succeed, the AEM system must provide information that meets the needs of Alberta's natural resource and environmental management system.

Moreover, as demonstrated by recent joint announcements of oil sands monitoring by Alberta and Canada, there are federal-provincial interactions that must be considered in order to provide comprehensive information and recommend policy options to both federal and provincial ministers and their respective cabinets. Any AEM system must provide decision-makers, at all levels, with the information they need.

Would an internal model provide better information, regardless of external perceptions? Or would it focus on specific, directed investigations that may tend to provide information that supports established or foregone policy decisions and the status quo? The Working Group concluded an internal model would be more responsive to needs of program managers and senior officials within government. The Working Group also observed that an arm's length model could do a better job of identifying emerging issues and providing issue-leading information to both officials and politicians.

2.2.3 Expectations of Municipal Governments

Municipal governments throughout Alberta are engaged, to varying degrees, with local monitoring programs for reasons ranging from concerns for good local management through to compliance with regulatory requirements set by senior governments. Existing monitoring initiatives by local governments are important when considering monitoring at the provincial scale. Before any provincial monitoring system is implemented, it will first be necessary to assess the extent and nature of municipal monitoring programs and ensure proper coordination and cooperation between various levels of government. Both the arm's length and internal models, if properly designed, could deliver the necessary coordination and meet the expectations of municipal governments.

2.2.4 Expectations of Canada

On 3 February, 2012 Ministers for Alberta and Canada announced a joint Canada Alberta Implementation Plan for Oil Sands Monitoring.[17] The plan committed Alberta and Canada to a "scientifically rigorous, comprehensive, integrated and transparent environmental monitoring program for the region." The three year implementation plan requires increased sampling frequency and expanded parameters and locations throughout the oil sands region. Ministers committed to annual progress reports on implementation with external scientific peer review of the program.

The Government of Canada is involved to varying degrees in many aspects of oil sands development. Federal involvement occurs through the civil service (Environment Canada, the Department of Fisheries and Oceans, and others) and at political levels. Coordination between federal and Alberta programs will be required, and could be achieved under either the arm's length or the internal model.

2.2.5 Expectations of the Scientific and Academic Community

The AEMP 2011 report concluded that the scientific and academic community would strongly prefer the arm's length model, for reasons of relevance, legitimacy and scientific credibility. The internal model is problematic in the eyes of the scientific and academic community:

- Could an internal model identify the data and information interests of the scientific and academic community?
- Could an internal model work more effectively than it has in the past to develop monitoring, evaluation and reporting programs that are seen as credible and legitimate by the scientific and academic communities?
- Could an internal model build the requisite level of trust, and be seen as free of political and industry influence?
- Could an internal model develop a data portal that works, from the perspective of scientific and academic stakeholders?

[17] Environment Canada News Release. February 3, 2012. Canada and Alberta Take Action to Implement World Class Monitoring System for the Oil Sands.

Certainly, an arm's length AEM system would be more likely to meet the rigorous standards of the international scientific community.

The international scientific community and many environmental advocates have questioned the pace and scale of developments in the oil sands region. Properly addressing this international debate will require an AEM system that can withstand full scientific scrutiny. In attempting to implement the AEM system, policy-makers must fully comprehend the very high bar of evaluation that any proposed system will be subjected to in the atmosphere of science, advocacy and international policy debate.

2.2.6 Expectations of Industry

The Working Group focused its efforts on industrial operators and service companies in the Lower Athabasca region. As the AEM system is extended to other regions of Alberta, the views of agricultural operators, forestry operators and urban industrial operators will become increasingly important.

Energy industry leaders have expectations for an AEM system that are similar to those of the scientific and academic community. Industry leaders are concerned that allegations of environmental mismanagement may not always be entirely factual. Industry leaders emphasize that data gathered and reported by an AEM system must be legitimate, credible and useful in a factual discussion of environmental effects. Industry leaders generally accept that a material expansion of monitoring programs is required. The Working Group found that most industry players support an arm's length model, for reasons of credibility, legitimacy and trust. Most industry representatives believe that relevance could be satisfied through either an internal or arm's length model.

Industry representatives tend to be more focused than other stakeholders on aspects of operational excellence; they want the AEM system to deliver factual, high quality data, quickly and cost effectively. Most industry leaders believe an arm's length model would more likely deliver operational excellence, driven by the expectations of the Governance Board.

Industry leaders share many views expressed by leading scientists: both want an AEM system that is credible, legitimate, relevant and operationally excellent. Industry has high expectations that information of real scientific value will be delivered.

2.2.7 Expectations of the Consulting and Information Technology Sectors

Alberta is home to a vital and growing sector of service companies that provide environmental, remote sensing, information technology and data services for the resource sector. These small and medium sized companies use advanced technologies; many of these technologies were developed in Alberta and are now recognized and utilized globally.

A highly technical environmental monitoring, evaluation and reporting system would provide opportunities for Alberta companies to further develop and expand advanced

environmental and data management services. The AEM system represents not just a cost for industry and government, but also an opportunity to develop Alberta-based technologies with global applications. Opportunities could be developed in many areas, including field program design, laboratory analysis, wireless and remote sensing technologies, statistical methods, data analysis, data and information management, and communications.

The consulting and information technology sectors expressed strong support for a scientific, credible and operationally excellent AEM system. Representatives of these sectors also expressed support for a management and governance model that facilitates the involvement of service companies and encourages the communication of good ideas.

2.2.8 Expectations of the Financial and Investment Sectors

Institutional investors expressed a strong need for reliable and accurate information on environmental issues; they use this information as part of their due diligence process. Many institutional investors are concerned that industry and government do not fully understand the long term environmental impacts of major resource development projects. They support the development of a well-run, science-driven AEM system.

For example, NEI Investments, who represent over C$1.6 trillion in assets and invest in companies that operate in the oil sands, commended the governments of Canada and Alberta for the announcement of a robust implementation plan for a world class monitoring system for the oil sands region and encouraged both levels of government to "address outstanding concerns about the long-term governance of the monitoring system."[18]

NEI further noted investor concerns about the environmental and social impacts of oil sands development, and "the need to understand, acknowledge and mitigate these impacts in a timely fashion if companies are to avoid serious risks to their long-term value. Controversy and conflicting information about the extent of potential impacts create unwelcome uncertainty for both companies and their investors." NEI supported the recommendation to undertake a transformation of the current monitoring system and urged early action to address outstanding governance issues. They emphasized that "the long-term credibility of the monitoring system will rest on the establishment of an independent governance structure guided by science…" stressing that "…this will contribute to both the actual quality of the monitoring system, and the public perception of its quality. It is essential that the governance model for the monitoring system should be beyond reproach – all the more so because of the atmosphere of mistrust that has been generated by conflicting information on oil sands impacts".

Similarly, the BC Investment Management Corporation[19], which manages assets of $85 billion, expressed its support for a rigorous, comprehensive and transparent environmental monitoring system. Such a system would motivate energy producers to invest in research and development of new technologies that enable industry to meet stronger regulations and higher project approval standards.

[18] 26 March 2012 Letter from NEI Investments to Ministers Peter Kent and Diana McQueen.
[19] BC IMC 24 March 2011. Letter to Minister R. Renner.

The Working Group noted investors' emphasis on science, strong governance and the delivery of credible, high quality information.

2.2.9 Expectations of Aboriginal Communities

First Nations have a unique and important role in shaping the debate over the AEM system – and not just in the oil sands region. Protection of land, air, water, and wildlife is anchored in Treaty rights, some of which have been affirmed by the Courts. Hence, the use of Traditional Knowledge should be a vital component of any regional resource management process, not the least of which relates to Reserve (Treaty) Lands that are uniquely protected.

Aboriginal peoples need to have confidence that the water, country foods, fish and wildlife that they depend upon for a major proportion of their sustenance are edible. The very threat of environmental contamination of the food chain or water supply will tend to undermine confidence in the regulatory environment – a risk that is not restricted to aboriginal communities. A lack of confidence in monitoring systems undermines the social licence extended to governments for the management of resources.

Concerns expressed by aboriginal peoples often extend beyond the need for traditional consultation mechanisms. The AEM system should embrace active inclusion of aboriginal peoples in the definition, participation and evaluation of environmental monitoring. This suggests that an arm's length model may have a higher probability of success than an internal model. The acknowledged success of the Northern River Basin Study (NRBS) among aboriginal communities in Alberta and the NWT may be instructive. The Board of the NRBS had strong aboriginal representation, and included community-based Traditional Knowledge study components that were done in parallel with high-level scientific investigations.

Aboriginal groups consulted by the Working Group expressed high interest in actively participating in both the design and execution of regional monitoring studies. The Working Group heard that legitimacy, credibility and trust are particularly important to aboriginal communities.

2.2.10 Expectations of Regional Communities

The Lower Athabasca region has a wide range of stakeholders whose primary concerns are region-specific. People employed in oil sands operations are concerned about the long term viability of those operations. Commercial operators in Fort McMurray depend on both existing operations and new projects for the continued success of their businesses. Outdoor enthusiasts are concerned about the environmental impact on the rivers and forests of the region. Aboriginal people and other rural residents are concerned that oil sands operations could impact the environment in which they live and work.

Every region of Alberta will have stakeholders with region-specific concerns. In every region, these stakeholders will want their views and suggestions to be heard. They want the AEM system to include mechanisms for stakeholder input.

Mechanisms for stakeholder input could include advisory boards as well as direct access to regional AEM management, the AEM Executive Director and the AEM Governance Board.

The presence and authority of the Governance Board gives the arm's length model a moderate advantage over the internal model, in the eyes of most regional stakeholders. In most other respects the two models would operate in a very similar manner at the regional level.

2.2.11 Expectations of Environmental Advocates and the General Public

The Working Group concluded that many environmental advocates and special interest groups do not trust the capability and resolve of the Government of Alberta to monitor the cumulative effects of development and control the pace of development in the oil sands region. Such groups are diverse, ranging from local fish and game associations through to provincial, national and international advocacy groups. Despite this diversity, many have advocated strongly for an arm's length AEM system.

Environmental activism comes in many shapes and sizes, and recent debate surrounding projects such as the Keystone XL and Gateway pipelines has highlighted a wide range of opinion. One side of this debate questioned the credibility of government and industry while another questioned the independence and underlying intentions of activists. Both have been engaged in substantive debate and rhetoric. The Working Group is unanimous in concluding that the general public, environmental advocates, elected representatives and defenders of industry would all benefit from a consistent and scientifically credible source of environmental information.

The general public, environmental advocates, elected representatives and defenders of industry would all benefit from a consistent and scientifically credible source of environmental information.

Albertans, as owners of the natural resources within the province, also need plain answers so they can have confidence that their political, social, economic and environmental interests are being protected. Differences of opinion frequently call into question Alberta's commitment to environmental protection and the interests of future generations, relative to short-term economic priorities. Such differences can only be addressed through sensible dialogue, informed by credible data. Without such information, dialogue often degenerates into political or ideological debate of questionable value. Once again, legitimacy and credibility become critical drivers for the structure and governance of a world class monitoring system.

Recommendation 4:

Stakeholder Expectations

The Working Group recommends that careful attention be paid to the expectations of stakeholders when selecting a governance model for the AEM system. Stakeholders with a particular interest in governance of the AEM system include the scientific and academic communities, industrial operators, service sectors, aboriginal communities, environmental advocates and the Government of Alberta.

2.3 Working Functions as Drivers of Structure and Governance

The Working Group studied the working functions, roles and responsibilities of an environmental monitoring, evaluation and reporting organization and considered how structure and governance would drive or be driven by each of the following activities:

- field operations and gathering of field data in the Lower Athabasca region;
- laboratory analysis and other analytical activities in the Lower Athabasca region;
- field activities and analytic operations across other regions of Alberta;
- data management and access to data and information by interested parties;
- centralized and regional management and administration;
- leadership at the level of the Executive Director;
- the appointment, roles and activities of advisory bodies, including science, traditional knowledge, industry and regional advisory boards or panels; and
- the appointment, roles and activities of senior governance bodies.

In considering the foregoing activities, the Working Group concluded that many functions within an AEM system would operate in much the same way, regardless of structure and governance at the senior levels of the organization, while other functions could be significantly affected by structure and governance. For example:

- field and laboratory data collection, management, and evaluation activities reside below the level of the Executive Director and would be relatively unaffected by the choice of governance model;
- the composition and role of advisory boards would be affected to some degree by the choice of governance model; and
- the composition, roles and relationships at senior levels of the organization would be significantly affected by the choice of governance model.

These factors are discussed in the following sections.

2.3.1 Data Collection, Management and Evaluation

Most field and laboratory functions within an AEM system would be essentially the same regardless of organizational structure and governance. The Working Group noted that certain field functions could be conducted by other government personnel if the AEM system existed within government.

Data management, interpretation and communication functions will be critical to the success of the AEM system, but the development and operation of those systems would be essentially the same regardless of organizational structure and governance. Governments will use AEM data and information to support policy development, regulatory activities and resource management. Industry will use environmental monitoring information to manage existing operations and plan new developments. Scientists, non-government organizations, and the public will need access to well-organized data and useful information.

The Working Group noted that operational and data management efficiencies could be achieved under the internal model, but also noted that an arm's length agency could work collaboratively with internal government departments if the leaders of those groups saw advantages in doing so.

The Working Group concluded that field and analytic operations, data management and communications would not be important drivers of organizational structure and governance.

2.3.2 Executive Leadership, Management and Administration

The Working Group identified significant differences in the culture and operating style of internal and arm's length organizations. In turn, the leadership, management and administration functions could be dramatically different under the arm's length model compared to the internal model.

Regardless of model, the AEM system would be led by an Executive Director responsible for performance against long term strategies and annual business plans. In an arm's length organization, the Executive Director would report to a Governance Board consisting of qualified individuals, predominantly if not entirely from outside government. In the internal model, the Executive Director would report to the Minister; the AEM system would operate as part of the provincial bureaucracy.

The background and skill set of an Executive Director recruited externally would likely be different from those of an Executive Director recruited from within government. The external candidate would likely have a more extensive background in either environmental science or environmental engineering and operations, and would ideally have experience in working with governance boards, while the internal candidate would likely have greater experience in the workings of government and meeting the needs of senior officials and politicians.

An external candidate would likely have greater experience assembling and leading a team of non-government employees, and would be inclined to look outside government for senior managers and team leaders. An internal candidate would likely have greater knowledge of qualified managers and team leaders within government.

In theory, the Executive Director, senior management and team leaders could be defined and filled in exactly the same way, regardless of the organizational model. In reality, appointments to these positions would be heavily influenced by choice of organizational model. In turn, the culture of the organization would be strongly influenced by the background and style of the Executive Director and the senior management team.

In terms of administration, the internal model would likely have greater access to government administration systems, including recruitment, human resource management, financial management, office services and the like. Access to such services could enable the AEM system to organize itself and commence operations more quickly and efficiently. In the arm's length model, the challenges of establishing administrative systems could be formidable, and could be a factor in the start-up and success of an arm's length agency.

2.3.3 The Science Advisory Board

The Working Group strongly supports the appointment of a Science Advisory Board (SAB), and considers the composition, role and activities of the SAB to be important considerations when choosing the organizational model for the AEM system.

Highly qualified scientists have historically demonstrated some reluctance to become involved with government departments where the commitment to scientific work can be overshadowed by political priorities. Scientists are generally more comfortable participating in arm's length organizations, particularly those that demonstrate a strong commitment to scientific work.

An AEM system within government could be challenged to attract highly qualified scientists to its SAB. The AEMP 2011 report concluded that the arm's length model is strongly preferred by most scientists; the Working Group heard the same message from the scientific and academic community.

2.3.4 Traditional Knowledge Advisory Panels

The Working Group strongly supports the appointment of a Traditional Knowledge Advisory Panel (TKAP) or panels (on a regional basis). In meetings and discussions with aboriginal leaders, the Working Group heard support for such advisory panels and their willingness to participate on specific panels for their regions with an additional desire to participate actively in community-based monitoring programs.

Both scientists and aboriginal people see a clear connection between scientific knowledge and traditional knowledge. As such, the Working Group recommends a close connection between the SAB and the TKAP.

The Working Group also heard a clear preference among aboriginal leaders for the arm's length model. Aboriginal leaders believe they can be more involved and have greater impact within an arm's length structure. The Working Group notes there are examples of successful integration of scientific monitoring programs with local communities that factor in traditional knowledge, notably programs undertaken previously by the Northern River Basins Study Board and some currently under way in the Northwest Territories (see Section 5.1).

As in the case of a SAB, the AEM system within government could be challenged to attract traditional knowledge experts to advisory panels.

2.3.5 Regional Advisory Panels

The Working Group supports the appointment of regional advisory panels to bring a wide range of regional experience to AEM operations. Membership could include farmers, ranchers, industrial operators, environmental experts and members of the general public.

Consideration of the regional advisory concept is at an early stage, and the Working Group believes that regional advisory panels could work under either organizational model. However, regional stakeholders generally express preference for the arm's length structure, in part because the Governance Board would provide a conduit for expression of views and concerns.

2.3.6 Design of a Working Organization

The Working Group concluded that most features of an AEM system below the Executive Director level would be very similar, whether the organization was created within government or as an arm's length model. The similarities and differences are shown in Figure 2.1.

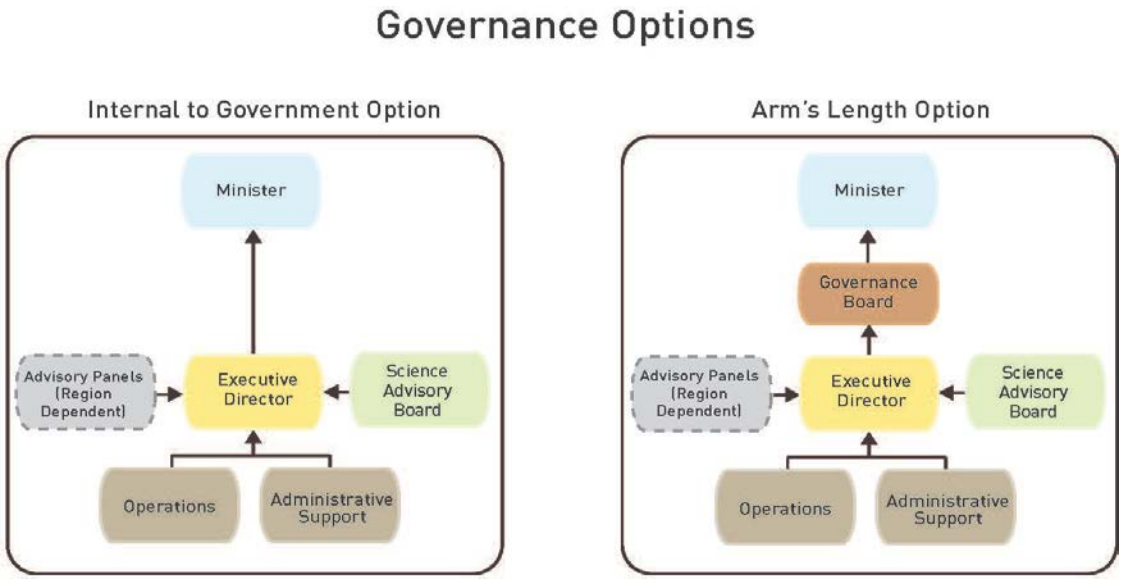

Figure 2.1: AEM Governance Options

The Governance Board provides an important conduit for stakeholder input. Its contributions could extend well beyond those of governance and oversight.

In both models the functions below the Executive Director would be structured in a similar way. The question becomes one of style and culture: would an internal organization operate differently simply because it is internal to government? Would the culture of an arm's length organization be different from that of an internal government department?

As discussed in previous sections of this report, the Science Advisory Board, the Regional Advisory Panels and the Traditional Knowledge Advisory Panels could be staffed and operated quite differently under the two models. The presence of a Governance Board in the arm's length model provides an important conduit for stakeholder input, in addition to its formal governance role. The presence of a Governance Board is the essential difference between the two models, and the contributions of a Governance Board could extend well beyond those of governance and oversight.

2.4 Lessons Learned from Existing and Prior Models

Environmental monitoring in Alberta predates the establishment of the Ministry of the Environment in 1971, dating back to the 1950s with water monitoring activities on the Bow and Oldman Rivers (Figure 2.2). Long-term monitoring programs and their history are described in Appendix C. Notably, these programs illustrate a rich history of cooperation between Alberta and Canada. The Working Group considered this history and the lessons learned from similar models.

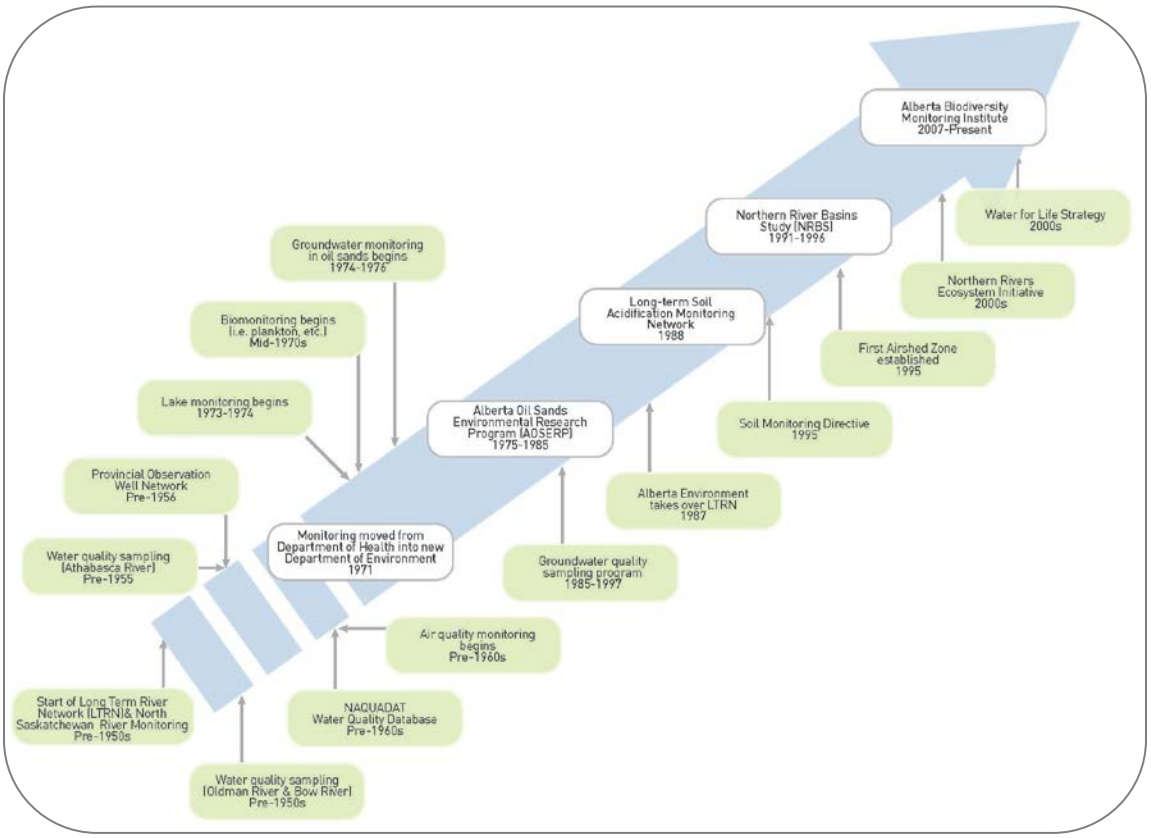

Figure 2.2: History and Timeline: Monitoring in Alberta

2.4.1 Regional, National and International Cooperation

The AEMP 2011 report noted that Alberta and Canada have an extensive history of coordination and cooperation on environmental matters consistent with federal legislation under the *Canadian Environmental Assessment Act* and Alberta provincial legislation under the *Environmental Protection and Enhancement Act*. The *Canada-Alberta Agreement on Environmental Assessment Cooperation,* the *Canada-Wide Accord on Environmental Harmonization*, the Northern River Basins Study (1991-1996) and the Alberta Oil Sands Environmental Research Program (1975-1980)[20] all represent constructive examples of federal-provincial cooperation on environmental matters.

The challenge of evaluating and addressing the cumulative environmental impact of ongoing industrial development also demonstrates a history of cooperation. Substantial work was done by industry, governments and other interested parties to address gaps in Alberta's monitoring system. For example, the Oil Sands Research and Information Network (OSRIN) recently completed a report[21] that addressed information and reporting for the oil sands region. Individual corporations and industry associations within the oil sands industry have commissioned studies and assessments of the existing monitoring networks. Alberta's forest industry has also implemented regional-scale monitoring and consultation programs.

As early as 1988, the Science Advisory Board to the US Environmental Protection Agency (EPA) recommended that the EPA "undertake research on techniques that can be used to help anticipate environmental problems" and that "an office be created within EPA for the purpose of evaluating environmental trends and assessing other predictors of potential environmental problems before they become acute" .[22] Subsequently, the US National Research Council Board on Environmental Studies and Toxicology and the Water Science and Technology Board reviewed the US EPA Environmental Monitoring and Assessment Program (EMAP) and made relevant recommendations for the development of rigorous and complex regional monitoring programs.

Significantly, the US Science Advisory Board (SAB) considered that a strength of the original proposal behind the EMAP system was its integration of information "across regions and across resource types" – a goal that is both familiar and relevant to Alberta planners. However, the SAB cautioned that the "EMAP is unlikely to succeed unless EPA commits permanent, senior-level positions to the program and recruits qualified people to fill them."[23] These recommendations made to the USEPA reinforce the Working Group's position that clear commitments for funding and personnel to secure the AEM system will be required to ensure the success of a world class provincial monitoring system in Alberta.

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[20] Wallace, R. 2011. History and Governance Models as a Blueprint for Future Federal-Provincial Cooperation on Environmental Monitoring in the Alberta Oil Sands Region. Alberta Water Portal Website Guest Columnist (www.albertawater.com) November 14, 2011. 12 pp.

[21] James, D.R. and T. Vold, 2010. Establishing a World Class Public Information and Reporting System for Ecosystems in the Oil Sands Region – Report and Appendices. OSRIN Report No. TR-5. 189 pp.

[22] Review of USEPA's Environmental Monitoring and Assessment Program: Overall Evaluation (1995) http://www.nap.edu/catalog/4931.html/.

[23] Ibid.

2.4.2 The Environmental Studies Research Funds

The Working Group examined the organization and management of the Canadian Environmental Studies Research Funds (ESRF) that were established in 1983 under federal legislation (currently the *Canadian Petroleum Resources Act*) to fund environmental and socio-economic research that assists the decision-making process for oil and natural gas development on Canada's frontier lands.
The ESRF is funded by annual levies on exploration and production licence holders in the frontier regions. The levies are calculated on a cents per hectare basis to raise sufficient funds to meet the ESRF budget for projects approved for the regions. The levies are approved by the Minister of Aboriginal Affairs and Northern Development Canada (AANDC) for the northern frontier and the Minister of Natural Resources Canada (NRCan) for the East Coast.

The formula for calculating levies is based on current and anticipated industrial activity in a specific area, the nature of issues to be addressed in the studies, and a number of other factors. The levies vary annually depending on the level of activity. Industrial operators provide a share of funds for projects that benefit more than one company; industry also provides a share of funds for projects that assist decision-makers in understanding current environmental or socio-economic issues related to oil and gas development and production.

Licence holders are invoiced annually based on their current holdings. If a new licence is issued, ESRF levies for the current year and the two previous years are due. This assumes that the new licence holder will benefit from studies that have been undertaken in the prior two years.

ESRF activities are managed by a 12-member Management Board, comprising:

- four members from industry (usually Canadian Association of Petroleum Producers and three active companies);
- one member from the Canada-Nova Scotia Petroleum Resources Board;
- one member from the Canada-Newfoundland and Labrador Petroleum Resources Board;
- four members from the federal government (National Energy Board, Environment Canada, AANDC, Department of Fisheries and Oceans); and
- two public members (one from the East Coast, one from the North).

The Chair of the Management Board has traditionally been held by the representative from the National Energy Board.

Since 1983, 192 studies have been undertaken by ESRF. The study reports are peer-reviewed and published by in a Technical Report Series[24]. The time and costs of the Management Board members are contributed by their home organizations with the exception of the two public members. Administration and support are provided by NRCan, and two regional technical advisors are retained on a contract basis. The costs of administrative and technical support are recovered in the levies.

[24] www.esrfunds.org.

Annually, projects are proposed to meet current and expected research needs, to fill data gaps, or to fund studies whose costs are such that sharing across industry makes sense. Regional technical advisors are assisted as necessary by other technical experts who comprise a technical advisory group to analyse the project concepts, set terms of reference for the studies, and provide ongoing technical guidance for the project. ESRF administers the contract tender process, and the Management Board evaluates the proposals, awards the contracts, and accepts the final reports.

2.4.3 The Alberta Biodiversity Monitoring Institute

The Alberta Biodiversity Monitoring Institute (ABMI) was incorporated in 2007 under the *Alberta Societies Act* and is an arm's length, value-neutral, scientific organization that measures and reports on the health of Alberta's wildlife and biodiversity. Its purpose is to monitor and report on biodiversity status and trends and to provide scientifically credible information to management systems to establish baselines and regional outcomes. Many agree that ABMI has achieved a high degree of professionalism that has engendered respect within government, industry, and the environmental community.

ABMI has employed a cumulative effects approach to monitoring aimed at detecting ecological effects from a diverse range of environmental stressors. It focuses on monitoring the structure of ecosystems while implementing protocols to sample the status and trends of 2,000 species, 200 habitat elements and 40 human footprint elements.

The ABMI prepared a concept paper for the Working Group that discusses governance, monitoring operations and the transition to a comprehensive Alberta monitoring program[25]. ABMI has organizational strengths that include a proven record of development and operation of province-wide monitoring programs that are seen as scientifically credible. As a result, ABMI has been broadly recognized as a reliable source of information about the status of our environment. These strengths could be replicated or incorporated in the proposed AEM system.

2.4.4 The Alberta Oil Sands Environmental Research Program

The Alberta Oil Sands Environmental Research Program (AOSERP; 1975-1980) grew out of national concerns about rapidly-expanding oil sands operations and their potential environmental and social impacts. The Joint Agreement that brought the AOSERP Program into being was signed by the Governments of Canada and Alberta in February 1975 (subsequently amended in September 1977). The AOSERP program was unique in its time for regional scope, scientific focus and federal-provincial cooperation. The program received financial support and seconded personnel from the federal government (Fisheries and Oceans Canada and Environment Canada), several Alberta Ministries and contract university researchers.

[25] Letter from the Alberta Biodiversity Monitoring Institute Concept Paper – Governance, Operations and Transition Considerations. 5 May 2012.

AOSERP was uniquely managed by a series of committees chaired by two federal and six Alberta representatives. They jointly reported through a Program Manager to the respective Ministers of Alberta Environment and Environment Canada. The program received international attention for its unique, cooperative and integrated approach to regional baseline monitoring and environmental research. By 1977, the AOSERP program was substantially reorganized and new governing agreements were required. These events and other administrative and fiscal tensions may have led the federal government to subsequently withdraw from the program. Notably, the 1981 Final Report[26] was submitted solely to the Minister of Alberta Environment, after which time the AOSERP program was disbanded.

2.4.5 The Northern River Basins Study

The Northern River Basins Study Board (NRBS) existed from 1991 to 1996 and completed regional studies on the Peace, Athabasca and Slave River basins in response to concerns expressed by northern residents following the 1991 approval of the Alberta Pacific Pulp Mill at Athabasca, Alberta. Recommendations by NRBS were presented to Ministers from the governments of Canada, Alberta and the Northwest Territories in June of 1996 and provided a valuable benchmark that defined the state of the Peace, Athabasca and Slave rivers as they then existed.

The governance structure for NRBS is shown in Figure 2.3. Participation of aboriginal peoples and the general public demonstrated that residents of the river basins care deeply about the ecological state of the region in which they work and live. Their support of NRBS signalled the importance of public involvement in setting goals and devising management plans for the basins. During the study's four-and-one-half years of scientific work, approximately 150 projects were initiated. Results of these studies were combined with extensive traditional knowledge research, public input and intensive analysis by some of Canada's most esteemed scientists. NRBS scientists discovered new challenges to the health of the aquatic ecosystem, particularly in terms of cumulative environmental effects.

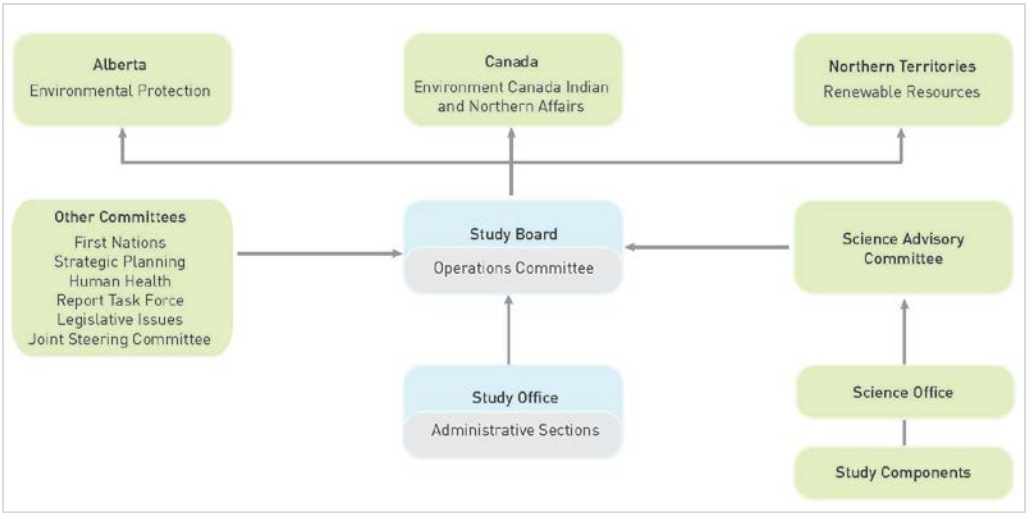

Figure 2.3: Governance Structure of the Northern River Basins Study

[26] Alberta Oil Sands Environmental Research Program. 1981. Summary Report: 1975 – 1980. 170 pp

NRBS considered a variety of ways that a successor organization could be structured to build on the established foundation. Importantly, the NRBS[27] final report contained several recommendations for continued studies in the region. Unfortunately, many of the key recommendations for continued joint actions by governments were not implemented. Perhaps some of the current controversies and concerns in the oil sands region might have been addressed by continuing the consultative programs of scientific research done in parallel with community-based programs that were a hallmark of the NRBS.

2.4.6 Wood Buffalo Environmental Association

The Wood Buffalo Environmental Association (WBEA) is focused on monitoring ambient air quality in the Lower Athabasca region. WBEA is respected in the scientific community and strongly supported by oil sands operators, environmental advocates, regional stakeholders, aboriginal communities and the Alberta Government.

The scientific competence and organizational leadership of the organization was noted by many stakeholders as key to the success of WBEA. The diversity and commitment of WBEA's Governance Committee is also recognized by many stakeholders.

2.4.7 Regional Aquatics Monitoring Program

Initiated in 1997, the Regional Aquatics Monitoring Program (RAMP) collects baseline data to characterize natural variability in the aquatic environment in the Athabasca oil sands region. The Environment Canada Oilsands Advisory Panel[28] noted:

> "...elements of an integrated, coordinated system ... were most noticeably lacking in RAMP. The RAMP program is industry funded and is the largest aquatic monitoring initiative in the oil sands region. Although we are confident it was conceived and implemented by people with the best of intentions it is not designed to be systemic, holistic, or adaptive."

The RAMP program was implemented by industry as part of its regulatory requirements, and by all indications has been in compliance with regulations. That being said, there is a mismatch between expectations of the regulatory system and those of many stakeholders, who would favour more rigorous, transparent, and integrated Lower Athabasca monitoring programs. The experience of RAMP reminds us of the importance of building an integrated AEM system based upon clearly articulated values and principles (Section 2.1). Failure in this regard exposes the organization to criticism such as that articulated above.

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[27] Northern River Basins Study. 1996. Final Report Appendix 7.8. http:://www3.gov.ab.ca/env/water/nrbs/index.html.

[28] A Foundation for the Future: Building an Environmental Monitoring System for the Oilsands. A Report submitted to the Minister of Environment Canada. 2010. Oilsands Advisory Panel. 49 pp.

2.5 Organizational Considerations: Summary

Regardless of organizational model, the AEM system will be challenged to meet stakeholder expectations, particularly with respect to values and principles. That being said, the choice of organizational model could well be an important factor in the success of the AEM system.

The Working Group considered some key questions that provided insight into the advantages and disadvantages of different organizations models:

- Can the expectations of numerous and diverse stakeholders be met?
- Can mechanisms be developed to engage stakeholders and benefit from their input?
- Will stakeholders see the AEM system as legitimate, trustworthy and scientifically credible?
- How will organizational leadership and culture develop over time?
- Will the choice of organizational model determine operational excellence?
- Will the choice of organizational model drive the value of environmental monitoring within the Alberta government?
- Will either model be more likely to achieve the Government of Alberta's stated objective of a world class science-based monitoring, evaluation and reporting system?

There are no guarantees that either organizational structure will deliver a successful, long-term monitoring, evaluation and reporting program. Much clearly depends upon the capabilities and abilities of those chosen for the job. The Northern River Basins Study Board provides a case in point. The program rapidly evolved into what has been described as a highly effective organization, through the good will of the Board members, the associated Science Advisory Board and the concerned scientific, aboriginal and local communities. Other examples of effective environmental monitoring, evaluation and reporting programs that have different organizational structures (such as ABMI and WBEA) demonstrate that good will, hard work and the dedication of professionals can make a system work, regardless of organizational model.

How then could the Government of Alberta work to increase the probability of success for any chosen program initiative? The Working Group concluded that either an arm's length or internal model *could* work, if the issues discussed in this Section 2 are addressed *and* achieved.

In summary:

- **Values and Principles** are of critical importance. Regardless of organizational model, the AEM system must respect the principles of legitimacy, credibility, relevance and operational excellence. The choice of model may well drive the organization's ability to deliver on these principles.
- **Stakeholder Expectations** are important considerations in selecting the organizational model - the stakeholders must be satisfied or the AEM system will not succeed.
- **Advisory Functions** could vary significantly, depending on the organization's ability to attract experts to the science, traditional knowledge and regional advisory functions.
- **Working Functions** below the level of senior management are likely to be structured, staffed and managed in much the same way, whether the organization is arm's length or internal to government.

3 Assessment of Structure and Governance Alternatives

The Working Group was asked to assess the relative advantages and disadvantages of an arm's length public agency and an internal to government alternative for implementing a world class AEM system. The Terms of Reference (Appendix A) provided by the Minister include specific criteria for the assessment of organizational models.

Section 2 discussed factors that drive structure and governance in an environmental monitoring system. This section evaluates the arm's length and internal models according to the factors discussed in Section 2 and the specific criteria provided by the Minister.

3.1 Description and Assessment of an Arm's Length Organization

The AEMP 2011 report recommended the Government of Alberta establish an independent public agency as the organizational model for environmental monitoring, evaluation and reporting in Alberta. There has been considerable discussion of the term "independent" as it was used in the AEMP 2011 report. In retrospect, the term appears to have led to confusion arising from different interpretations. For some, the word simply referred to freedom from interference. To others the term had a very specific meaning. There are no truly independent entities in Government other than the judiciary, which is specifically referred to in the Canadian Constitution. The AEMP 2011 report did not intend to propose the creation of a unique quasi-judicial body, nor does the Working Group propose to do so.

Arm's length means the organization has "some degree of autonomy from government" but is not removed from its accountability to government.

Use of the term arm's length is perhaps more helpful in describing the governance structure for the AEM system. The Working Group interprets arm's length as meaning the organization has "some degree of autonomy from government"[29]. The term arm's length is clear in the context of administrative tribunals. Although an arm's length agency makes independent administrative decisions, it is not removed from its accountability to government. There remains a direct accountability mechanism through the governance body to the Minister. When an arm's length agency is established, a mandate document sets out the roles and responsibilities of the Minister and the Governance Board, clearly providing the accountability mechanism.

An arm's length AEM agency would clearly remain accountable to government. An arm's length structure would have the benefit of distancing the AEM agency from the political lobbying activities of governments and special interest organizations.

Examples of arm's length organizations within Alberta include the Alberta Securities Commission, Alberta Utilities Commission, Alberta Treasury Board, Energy Resources Conservation Board, Alberta Health Board and the Alberta Biodiversity Monitoring Institute.

[29] At a Crossroads--The Report of the Board Governance Review Task Force, 2007. 31 pp.

The Government of Canada has captured this concept in a document from the Privy Council Office: [30]

> "The degree of independence from Government varies with the type of organization. Governments delegate decision-making powers to these bodies, in part, to preserve public confidence in the fairness of the decision-making process. In turn, the exercise of these powers requires careful attention to ensure that the appropriate degree of independence is maintained. The Minister is answerable in general to Parliament for the activities of the organization, but maintains an arm's length relationship with it."

The value in establishing the AEM system as an arm's length organization arises when dealing with actual and perceived conflict of interest situations between the monitoring and communication activities of the AEM system and the interests of individuals, groups, or organizations that create policy, make decisions on resource use, or take an advocacy stand.

The value of an arm's length organization arises when dealing with actual and perceived conflict of interest situations.

In the case of environmental monitoring for resource management, the potential for conflict of interest is clear. The Government of Alberta owns the resource, establishes planning frameworks for management, develops policies and regulations for use, grants approvals, enforces regulations, derives financial benefit, and is responsible for assessing and mitigating environmental impacts. Environmental monitoring provides a means of testing government's efforts to balance these potentially competing interests. Separation of the mandate for management, policy development, regulation, enforcement, and environmental protection from that of environmental monitoring would shield government from both real and perceived conflicts of interest.

The focus of the AEM system is to produce credible, reliable information on the state of Alberta's environment. This information then forms the basis for the development of government policy and for informed discussion on environmental issues throughout the province. Creation of an arm's length public agency in and of itself does not guarantee legitimacy and credibility. It would still require the right mandate, the right managers and scientists, a capable Executive Director and a responsible Governance Board. That being said, an arm's length public agency would free government to perform its mandate for management, policy development, regulation, enforcement, and environmental protection without fear of criticism arising from real or perceived conflict of interest with the collection and dissemination of high-quality monitoring information.

The focus of the AEM system is to produce credible, reliable information on the state of Alberta's environment.

[30] Guide Book for Heads of Agencies: Operations, Structures and Responsibilities in the Federal Government, August 1999.

3.1.1 The Arm's Length Structure

A simple schematic of an arm's length structure is shown in Figure 3.1. An arm's length agency would be governed by a Governance Board, responsible to the Minister of Environment and Sustainable Resource Development.

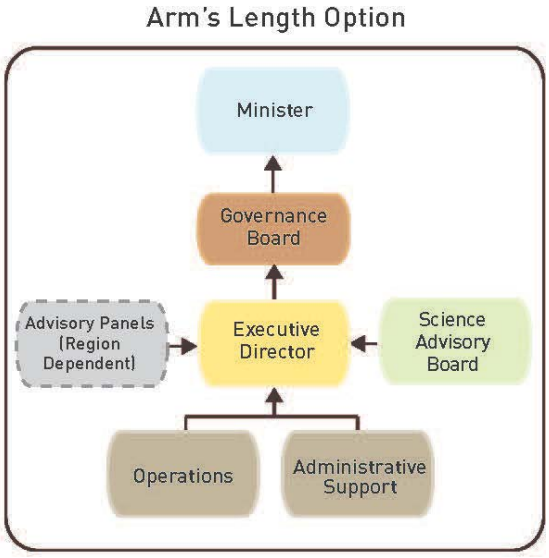

Figure 3.1: Arm's length Organization Model

The Chair of the Governance Board must be appointed by the Minister; appointments of Board members would be ratified by the Minister. The Chair and all Board members could be replaced by the Minister at any time.

The Governance Board would operate according to a roles and mandate document agreed to and supported by the Minister. The roles and mandate document would clarify the authorized extent of agency activities, the scope of independent actions and the broad objectives of the arm's length agency.

The Governance Board would consist of 5 to 10 individuals, including the Chair and vice Chair. Governance Board members would be selected on the basis of demonstrated competency in one or more fields, including environmental science, financial management, resource development and organizational governance.

The Governance Board would select and appoint the Executive Director and approve the appointment or dismissal of senior managers reporting to the Executive Director. The Governance Board would approve annual budgets, longer term business plans and all business initiatives and expenditures beyond the authority of the Executive Director.

The Executive Director would be responsible for leading the senior leadership team, overseeing all aspects of agency operations. All operating and administrative functions would report through the senior leadership team to the Executive Director.

The Executive Director would receive advice from advisory panels, including the Science Advisory Board, the Traditional Knowledge Advisory Panel and Regional Advisory Panels.

There are numerous models that have addressed issues such as regional operations. The Governance Board and the Executive Director should examine these existing operational models and choose one most appropriate for the AEM system. For example, the management team could consist of province-wide Technical Directors for the various technical disciplines (e.g., monitoring activities, scientific activities, data and information management and communications), together with Regional Directors responsible for field operations in each region of Alberta. It is envisioned that both Technical Directors and Regional Directors would report to the Executive Director, as would the Director of Finance and Administration. The actual management structure would of course be developed by the Executive Director as the AEM system is established.

The Science Advisory Board (SAB), appointed by the Executive Director with the advice and consent of the Governance Board, would consist of highly qualified and respected experts in fields directly or closely related to environmental sciences and monitoring. The SAB would meet several times each year to review the design of monitoring programs, examine the quality of work undertaken by the agency, advise the agency of emerging trends and best practices and advise the agency about its own environmental research initiatives. The SAB would provide peer review and independent, credible, expert advice on the performance of Alberta's environmental monitoring, evaluation and reporting system. The SAB would provide its advice to the Executive Director in the normal course, and would have direct access to the Governance Board if necessary.

A Traditional Knowledge Advisory Panel (TKAP) would consist of knowledgeable representatives of the First Nation and Métis communities. The TKAP would provide a wide range of advice based on traditional knowledge of the environments in various regions of Alberta. Localized traditional knowledge and advice could be gathered at the regional level and conveyed to the agency through the TKAP. The TKAP would share its advice with the Executive Director and the SAB in the normal course, and would have access to the Governance Board if necessary.

Each Regional Advisory Panel (RAP) would consist of knowledgeable individuals from each environmental monitoring region of Alberta (i.e., land use region). RAP members would be selected to represent a cross section of interests in each region, including municipalities, industrial operators, environmental groups and the general public. Each RAP would provide its advice to the Regional Director in the normal course, and would have access to the Executive Director and the Governance Board if necessary.

3.1.2 Relationships with Other Government of Alberta Agencies and Departments

The Working Group understands that environmental monitoring is but one aspect of Alberta's broader system of natural resource and environmental management. The role of environmental monitoring within the broader system is to inform policy makers, regulators and other government ministries and agencies. The AEM system does not have a policy-making or regulatory role itself – it is only there to provide data and information that is useful to the larger system.

Regardless of organizational model, the AEM system will interact with other Government of Alberta ministries and agencies on a frequent basis. In the case of the arm's length model, many interactions would occur either at or below the level of the Executive Director. Interactions below the Executive Director level are not expected to vary from one organizational model to another, and have not been analyzed further by the Working Group.

The Executive Director would interact with other ministries and agencies in the normal course, just as the Chair of the ERCB works with the heads of ministries and agencies today. Through the Governance Board, the Minister would make the expectations of government known to the Executive Director, whose performance would, in part, be measured against those expectations.

Relationships between the Executive Director, the Governance Chair and the ministry would be critical to the success of an arm's length agency. The Executive Director would report on a regular basis to the Chair; the Chair would communicate on a regular basis with the Minister and with senior officials in the ministry. To be successful, the Executive Director would also need to establish open channels of communication with senior officials in the ministry. The relationship would be one of communication and cooperation. Both ministry officials and the Executive Director would be expected to communicate and cooperate at a high level. An agreed upon roles and mandates document would provide for a common understanding of the respective roles and responsibilities of the Minister, the Governance Chair, the Governance Board members and the Executive Director. Activities undertaken by the AEM system management team will be guided by its enabling charter and by the mandates, policies and rules of the Government of Alberta. Between these two boundary conditions, the AEM system will have scope for independent action.

3.1.3 Relationships with the Government of Canada

The Working Group envisions an arm's length agency that exists under a mandate from the Government of Alberta. The agency would report to a Governance Board whose members and Chair are appointed by a Minister of the Government of Alberta. In every sense the arm's length agency is a part of the Government of Alberta – it simply operates day to day at arm's length from the government.

The Government of Canada and its various ministries and agencies would be seen as stakeholders of the agency, and the relationship should be constructive and professional. The Working Group recognizes that Environment Canada has valuable capabilities that could assist the agency from time to time.

It is expected that an arm's length agency would fulfill Alberta's responsibilities under the oil sands monitoring partnership between the Governments of Canada and Alberta.

3.1.4 Relationships with First Nations and Métis

Aboriginal peoples would provide advice and feedback to the agency through the Traditional Knowledge Advisory Panel, described above. First Nations and Métis groups could also be involved in community-based field data gathering and analysis, through AEM regional operating organizations. In many regions, First Nations and Métis groups could be members of the Regional Advisory Panel.

The Working Group and AEMP both received expressions of interest from aboriginal groups about direct involvement in the design and implementation of monitoring programs. Aboriginal groups also voiced strong interest in community-based monitoring. Funding and management of aboriginal field monitoring programs would need to be negotiated and implemented by AEM regional management.

As discussed above, the TKAP would work most closely with the Executive Director and the Science Advisory Board. The TKAP would have access to the Governance Board as necessary.

3.1.5 Relationships with Current Monitoring Partners

The AEMP 2011 report recommended that an arm's length agency be responsible for all aspects of managing, co-ordinating and evaluating effects monitoring, whether field activities are conducted directly by the agency or by other entities acting on behalf the agency. The Working Group supports this earlier recommendation.

As long as other entities are performing to a high standard and providing the information required by the AEM system, those entities could continue their work under the sponsorship of the agency. The relationship would be that of a service provider to the agency, with funds flowing from the agency to the service provider in return for high quality information. Failure to perform could lead to various consequences, including migration of the service functions to another provider or in-house.

Relationships with current monitoring partners and other service providers are not expected to vary significantly from one model to another.

Effects Monitoring describes monitoring activities undertaken to determine the status or trend of specific environmental attributes or indicators that reflect the current state of the environment. Simply, effects monitoring focuses on changes in the environment resulting from various anthropogenic activities. Effects due to natural changes can also be observed.

3.1.6 Relationships with Provincial and Regional Stakeholders

The Executive Director, Technical Directors and Regional Directors would be expected to interact with external stakeholders in a professional and transparent manner, regardless of organizational model.

The arm's length model significantly increases the mechanisms and opportunities for interaction, simply because the Board Chair and individual board members would serve as valuable channels through which external opinions and perspectives could enter the organization. Just as public members on a university board of governors bring external viewpoints to the university, so too would Governance Board members bring external views to an arm's length agency.

3.1.7 Effective Management of the Monitoring System

Regardless of the organizational model, the Working Group recommends that the AEM system be responsible for all aspects of effects monitoring[31] (including baseline[32] and cumulative effects monitoring) in all regions of Alberta. Our discussions with industry operators and scientific experts indicate that these parties favour an arm's length agency, in part because they believe it would be better managed and operated than an organization within a government ministry, and because they understand the importance of freedom of bias and perception of bias.

Regarding compliance monitoring, the AEMP 2011 report recommended that compliance monitoring and enforcement remain outside the mandate of the AEM system. The Working Group supports that recommendation, regardless of organizational model. The possible migration of data management arising from compliance monitoring activities (but not enforcement) to the AEM system could be addressed once the AEM system is up and running effectively.

3.1.8 Accessibility, Quality and Transparency of Data and Information

Regardless of model, the AEM system must provide full and open access to quality data and information in a user-friendly and transparent way. The arm's length model again brings the advantage of a Governance Board that will be motivated to deliver data and information to a high standard. The Executive Director and the management team would be expected to respond effectively to the advice and consent of the Governance Board.

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[31] **Effects Monitoring**: describes monitoring activities undertaken to determine the status or trend of specific environmental attributes or indicators that reflect the current state of the environment. Simply, effects monitoring focuses on changes in the environment resulting from various anthropogenic activities. Effects due to natural changes can also be observed (AEMP p. 13).

[32] **Baseline Monitoring**: describes the state of the environment and its natural variability. It quantifies background levels of physical, chemical and biological parameters at locations that are least developed or ideally "non-impacted" by anthropogenic disturbance so that environmental changes can be measured. Baseline monitoring establishes the benchmark against which sites that are affected by development can be compared. (AEMP p. 13).

3.1.9 Scientific Oversight and Validation

The importance of science and the role of a SAB are topics that were addressed in detail in the AEMP 2011 report; these topics have also been discussed in other sections of this report.

The arm's length model is strongly favoured by the scientific community. The Working Group expects that scientists with strong international reputations would more probably be attracted to work with and for the arm's length agency and to serve on the SAB.

3.1.10 Allocation of Scarce Resources

Funding of the AEM system is discussed in Section 4 of this report. Apart from the challenge of sourcing funds, the AEM system will have to manage its finite funding carefully. There will never be enough money to do everything the system will aspire to do nor to respond to every research interest, or every third party interest. Spending priorities will always have to be assessed, established and followed. That being said, full budgetary control over all its activities will be required for the organization to deliver its mandate.

Under the arm's length model, the Government of Alberta would advise the Governance Board of the overall funding envelope for the coming year. The AEM management team would prepare annual budgets for all activities and submit those for review by the Executive Director, who would in turn submit the aggregate budget to the Governance Board for formal approval. AEM would need to allocate available funds to the highest priorities and, depending on evolving priorities, the Government of Alberta could well be asked to provide additional funding.

The Governance Board would play a critical role in this process, particularly over the longer term. The Chair of the Governance Board would discuss variable funding levels with Government, with those parties providing funds through various levies and taxes (i.e., industrial operators), with partner institutions that might help leverage investment, and with those who might be prepared to support the AEM system mandate.

Baseline Monitoring: describes the state of the environment and its natural variability. It quantifies background levels of physical, chemical and biological parameters at locations that are least developed or ideally "non-impacted" by anthropogenic disturbance so that environmental changes can be measured. Baseline monitoring establishes the benchmark against which sites that are affected by development can be compared.

3.1.11 Operational Excellence

Operational Excellence is discussed in other parts of this report. In most respects, the Executive Director and the senior management team will drive operational excellence and their abilities and efforts will determine the outcome. That will be true regardless of organizational model.

The arm's length model could stimulate operational excellence if the Governance Board embraces the concept and sets appropriate objectives for the Executive Director and the management team. The pressure exerted by the Governance Board could be significant; a strong commitment to operational excellence ought to be a high priority of the Governance Board.

The arm's length agency could be required to establish its own efficient administrative systems. Ideally, an arm's length agency would rely initially on existing Government of Alberta systems for basic administrative functions including support staff, payroll, accounting, office services and the like. However, there are many examples of arm's length agencies that have established independent administrative systems. This is an important issue that needs to be carefully planned right from the start, regardless of organizational model.

3.1.12 Legitimacy and Credibility

The Working Group is convinced that no other model will achieve the same standards of legitimacy and credibility as would the arm's length model.

The critical tests of legitimacy and credibility are discussed in other parts of this report. The Working Group is convinced that no other model will achieve the same standards of legitimacy and credibility as would the arm's length model.

3.2 Description and Assessment of the Internal to Government Organization

In March 2012 the Minister of Environment and Sustainable Resource Development asked the Working Group to consider an internal to government model for environmental monitoring, evaluation and reporting in Alberta. While the Working Group does not favour the internal to government model, it acknowledges that an internal model could work with the right mandate, the right managers and scientists, a capable Executive Director and appropriate advisory boards and panels that would bring external viewpoints to the internal organization.

The Working Group noted Alberta's current approach to environmental effects monitoring is not well coordinated or integrated and would benefit from a more rigorous scientific foundation. As stated in the AEMP 2011 report, monitoring networks operated throughout the province by industrial, municipal, provincial and federal interests fall short of providing the cumulative effects monitoring required to understand and manage environmental impacts over the longer term. Existing monitoring networks are generally sub-optimal and/or duplicative. Collectively they are neither cost-effective nor do they constitute world class science.

In assessing the internal option, the Working Group assumed that the Government of Alberta would change its current approach to environmental monitoring, evaluation and reporting, adopting a comprehensive system that is centrally coordinated, integrated amongst the various environmental media, has scientific oversight and is accessible and open. Establishing the AEM system with departmental status represents a significant departure from the status quo.

The Working Group also considered the expectations of stakeholders and concluded that the internal model would be challenged to satisfy their expectations, particularly those stakeholders outside the Government of Alberta bureaucracy.

3.2.1 The Internal to Government Structure

A simple schematic of the internal to government structure is shown in Figure 3.2. The schematic is identical to that of the arm's length option, except for the absence of a Governance Board. In the internal model the Executive Director would report directly to the Minister of Environment and Sustainable Resource Development.
The Working Group considered several variants of the internal model. In the extreme, the internal model could consist of widely distributed functions resident in several departments; the Executive Director would monitor and coordinate as best as possible. The Working Group would argue strongly against any sort of distributed model. Whether internal to government or at arm's length, the AEM system must be a single system with an unwavering focus on environmental monitoring, evaluation and reporting. Organization, coordination and a strong scientific focus argue for a single AEM system.

The Minister would select and appoint the Executive Director and approve the appointment or dismissal of senior managers reporting to the Executive Director. The Minister would approve annual budgets, longer term business plans and all business initiatives and expenditures beyond the authority of the Executive Director.

The Executive Director would be responsible for leading the senior leadership team, overseeing all aspects of agency operations. All operating and administrative functions would report through the senior leadership team to the Executive Director. Most aspects of an internal AEM system below the level of the Executive Director would operate in a similar way to the arm's length model.

The Executive Director would receive advice from advisory panels, including the Science Advisory Board, the Traditional Knowledge Advisory Panel and Regional Advisory Panels.

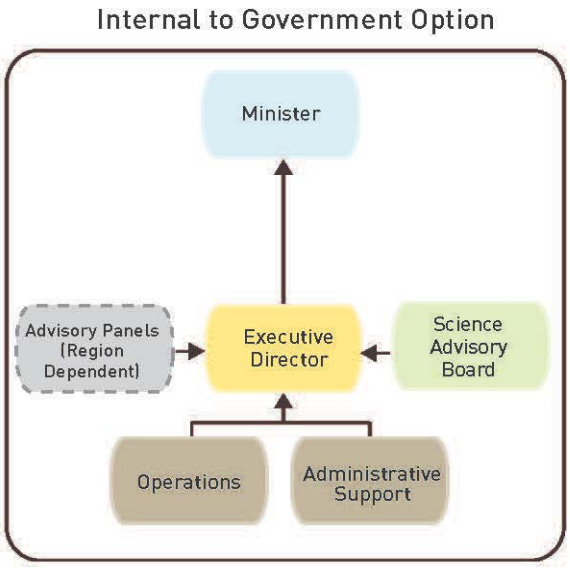

Figure 3.2: Internal to Government Organization Model

As is the case in the arm's length model, the Executive Director would select operating and administrative support models most appropriate for a multi-regional, scientific monitoring, evaluation and reporting organization.

The Science Advisory Board (SAB) would consist of highly qualified and respected experts in fields directly or closely related to environmental monitoring. The membership, activities and reporting relationships of the SAB would ideally be exactly the same as in the arm's length model. In reality, the scientific community has demonstrated less enthusiasm for the internal model and the Working Group believes it may be more difficult to recruit and work with the very best scientists under the internal model.

The absence of a Governance Board in the internal model eliminates the opportunity for the SAB to bring its concerns to a Governance Board. Of course, the SAB could take its concerns directly to the Minister, which the SAB could also do in the arm's length model.

As is the case in the arm's length model, the Traditional Knowledge Advisory Panel (TKAP) would consist of knowledgeable representatives of the First Nation and Métis communities. The TKAP would provide a wide range of advice based on traditional knowledge of the environments in various regions of Alberta. The TKAP would provide advice to the Executive Director in the normal course, but would not have access to a Governance Board as in the internal model. The TKAP could of course take its concerns to the Deputy Minister.

As in the arm's length model, each Regional Advisory Panel (RAP) would consist of knowledgeable individuals from each environmental monitoring region of Alberta. Each RAP would provide its advice to the Regional Director in the normal course, and would have access to the Executive Director if necessary. Once again, the absence of a Governance Board could be seen negatively by those serving on RAPs: under the internal model, RAPs would have nothing equivalent to their arm's length access to the Governance Board.

The Working Group concluded that an internal AEM system would effectively need to operate as a new department of environmental monitoring, evaluation and reporting, separate from the regulatory or policy operations of government. Such a department would still require substantive new funding and management resources.

3.2.2 Relationships with Other Government of Alberta Agencies and Departments

Once again, the Working Group understands that environmental monitoring is but one aspect of Alberta's broader system of natural resource and environmental management.

Regardless of organizational model, the AEM system will interact with other Government of Alberta ministries and agencies on a frequent basis. Interactions below the Executive Director level are not expected to vary from one organizational model to another, and have not been analyzed further by the Working Group.

The Executive Director would report directly to the Minister on a regular basis, which would improve interaction with other government entities relative to the arm's length model. The Minister would make the expectations of government known to the Executive Director, whose performance would be measured against those expectations. Relationships between the Executive Director and the Ministry would be critical to the success of an internal model.

The internal model would have superior access to senior officials within other government departments and agencies, and those officials would directly advise the AEM system of monitoring information required by government. This would be one clear advantage of the internal model.

3.2.3 Relationships with the Government of Canada

Under the internal model the AEM system would operate as part of the Government of Alberta, and would clearly be seen as an instrument of the Government of Alberta. It is expected that an internal AEM system would fulfill Alberta's responsibilities under the oil sands monitoring partnership between the Governments of Canada and Alberta. The Working Group concluded that relationships with the Government of Canada would not be materially affected by the choice of governance model.

3.2.4 Relationships with First Nations and Métis

Aboriginal people would provide advice and feedback to an internal organization through the Traditional Knowledge Advisory Panel, described above. First Nations and Métis groups could also be involved with regional operating groups at field locations, and in many regions the First Nations and Métis groups could be members of the Regional Advisory Board.

The Working Group has received similar advice to that received by AEMP one year ago. The majority of aboriginal leaders prefer an arm's length agency with useful mechanisms for aboriginal involvement. Aboriginal leaders do not have the same confidence in the internal model.

3.2.5 Relationships with Current Monitoring Partners

As described in Section 3.1.5, relationships with current monitoring partners and other service providers are not expected to vary significantly from one model to another.

3.2.6 Relationships with Provincial and Regional Stakeholders

The internal model would have superior access to senior officials within other government departments and agencies, and those officials would directly advise the AEM system of monitoring information required by government. This would be one clear advantage of the internal model.

The Executive Director, Technical Directors and Regional Directors would be expected to interact with external stakeholders in a professional and transparent manner. That would be the expectation regardless of organizational model.
The internal model has fewer mechanisms and opportunities for interaction, simply because there is no Board Chair or individual board members to serve as channels through which external opinions and perspectives could enter the organization.

3.2.7 Effective Management of the Monitoring System

Regardless of organizational model, the Working Group recommends the AEM system be responsible for all aspects of effects monitoring (including baseline and cumulative effects monitoring) in all regions of Alberta. Since compliance monitoring is part of Alberta Environment and Sustainable Resource`s mandate, there is the potential to realize cost efficiencies associated with these two systems. Caution would have to be exercised to manage potential conflicts of interest.

Our discussions with industry operators and scientific experts indicate that these parties favour an arm's length agency, in part because they believe it would be better managed and operated scientifically than would an organization internal to government.

3.2.8 Accessibility, Quality and Transparency of Data and Information

Regardless of model, the AEM system will be challenged to provide excellent access to quality data and information in a user-friendly and transparent way. The internal model again suffers from the lack of a Governance Board that could motivate the management team to deliver data and information to a high standard.

3.2.9 Scientific Oversight and Validation

While a science-based organization could be established under both governance models and opportunities for scientific oversight and validation are available to both, the Working Group concluded the recruitment of scientific expertise would be easier within an arm's length organization. The internal model is not supported by the scientific community, and the Working Group expects that influential scientists would criticize rather than support an internal AEM system.

3.2.10 Allocation of Scarce Resources

The challenge of sourcing funds and operating under tight budgetary constraints are common to both organizational models.

Under the internal model, the AEM management team would prepare annual budgets for all activities and submit those for review through normal government budgeting processes.

Funding for the AEM system should be ring-fenced and not subject to reallocation to other departments. History reminds us that this is by no means certain. In a very real sense, today`s debate about the adequacy of environmental monitoring is a natural outcome of funding that has simply not kept pace with development.

The internal model would once again suffer from the lack of a Governance Board, which would serve a valuable role in securing industry funds and convincing government to flow those funds through, in whole, to the AEM system.

3.2.11 Operational Excellence

As described in Section 3.1.11, the Executive Director and the senior management team will drive operational excellence and their abilities and efforts will determine the outcome. That will be true regardless of organizational model.

The internal model would not have a Governance Board, and would not have the operational excellence champions that would likely be found on a Governance Board.

3.2.12 Legitimacy and Credibility

Legitimacy and credibility are the critical weakness of the internal model. It will be difficult for an internal organization to establish legitimacy and credibility with the scientific and academic community, the environmental advocate community and much of the general public.

3.3 Assessment of Structure and Governance Alternatives: Conclusions

The Working Group carefully considered the merits and weaknesses of both the arm's length and internal to government models. Each model has unique merits; each model would face implementation challenges; each model would require excellent leadership, management, people and resources to succeed over the longer term.

The Terms of Reference provided by the Minister of Environment and Sustainable Resource Development specify certain criteria for the evaluation of each organizational model. In the course of its work the Working Group also developed its own criteria for evaluation. This concluding assessment compares the two models against both sets of criteria.

3.3.1 Assessment by Working Group Criteria

Table 3.1 presents a qualitative assessment of the arm's length and internal models, in terms of values and principles, the expectations of stakeholders, and the effectiveness of working functions.

Table 3.1: Assessment of Organizational Models - Working Group Criteria

Working Group Criteria	Arm's Length Model	Internal Model
Values and Principles	◕	◑
Legitimacy	●	◔
Credibility	●	◔
Relevance	◑	◑
Operational Excellence	◕	◑
Stakeholder Expectations	◕	◑
Alberta Political Leadership	◕	◑
Alberta Bureaucracy	◔	●
Municipal Governments	◑	◑
Federal Political Leadership	◕	◔
Federal Bureaucracy	◔	◕
Scientific/Academic Community	●	◑
Energy Operators	◕	◔
Energy Service Sector	◕	◔
Consulting & IT Sector	◕	◑
Financial & Investment Sector	●	◔
Aboriginal Communities	●	◔
Regional Communities	◕	◑
Environmental Advocates	●	○
Alberta General Public	◑	◑
Effective Working Functions	◕	◑
Field Activities	◕	◕
Analytic Activities	◕	◕
Data Management & Evaluation	●	◕
Central Functional Management	◕	◑
Regional Operations Management	◕	◑
Administrative Systems and Support	◑	●
Executive Leadership	●	◑
Science Advisory Board	●	◔
TK Advisory Panels	●	◑
Regional Advisory Panels	●	◑

Legend				
●	◕	◑	◔	○
Satisfactory		Neutral		Unsatisfactory

3.3.1.1 Values and Principles

Delivering world class environmental monitoring programs that satisfy the values and principles of many stakeholders will be a major challenge. Measuring up to those values and principles will be critical to the success of the AEM system. The choice of organizational model will in many ways drive the organization's ability to deliver on values and principles.

The working Group concludes that the AEM system must have, and be seen to have, both legitimacy and credibility in the eyes of diverse stakeholders. In some circumstances, trust can be built over time; however, building trust in anything other than an arm's length model may be extremely difficult, given the negative opinions of many regarding existing monitoring programs in the Lower Athabasca region.

The Working Group therefore concludes that the necessary standards of legitimacy and credibility can only be effectively delivered through an arm's length model.

Relevance measures the system's ability to meet the needs of a broad range of stakeholders. The Working Group concluded the arm's length model was more likely to meet the needs of external stakeholders, while the internal model would be more relevant to the needs of bureaucrats and departments within the Government of Alberta.

Both models could deliver operational excellence. The internal model would have the advantage of delivering some degree of operational excellence more quickly, simply because an internal structure could rely on existing systems and support within government. On the other hand, the arm's length model could deliver a higher level of operational excellence over the long term, in part because of a highly-focused team structure and in part because its Governance Board would set operational excellence as an important measure of performance. On balance, the Working Group concluded the arm's length model would have a modest advantage over the internal model in terms of operational excellence.

Overall, the arm's length model is seen as the preferred model in terms of values and principles.

3.3.1.2 Stakeholder Expectations

If stakeholders are not satisfied with the structure and organization of the AEM system, they will not participate in delivering the outcomes necessary to provide accurate, trustworthy and useful data and information on Alberta's air, land, water and biodiversity. Unsatisfied stakeholders will be a constant source of criticism and difficulty.

The Government of Alberta's political leaders will only be satisfied if the general public is satisfied; political leaders want an AEM system that provides accurate and useful information and demonstrates that the government is doing what needs to be done. The Working Group concluded that the arm's length model would do a better job of satisfying both provincial and federal political leaders over the longer term.

Senior government officials must also be satisfied with the performance of the AEM system. Here, the Working Group concluded that an internal model could be better integrated with existing programs and it could respond more appropriately to the needs of both provincial and federal government officials.

Finally, the Working Group concluded that the arm's length model would better satisfy the expectations of virtually all other stakeholders and would be excellent in its ability to meet a broad diversity of viewpoints, including the expectations of the following stakeholders:

- scientific and academic community;
- energy operators;
- energy service sector;
- consulting and information technology sector;
- financial and investment sector;
- aboriginal communities;
- regional communities;
- environmental advocates; and
- general public

3.4 Effective Working Functions

These criteria focus on the ability of the AEM system to manage the activities of employees and third party providers when conducing field activities, analyzing the results of monitoring programs, and managing monitoring data and information. These criteria also measure the effectiveness of administrative support and executive leadership. Overall, the Working Group concluded that both models could deliver acceptable results. The arm's length model was rated slightly higher in meeting the objectives for data management and executive leadership, while the internal to government model was rated slightly better with system administration because existing government administrative systems could be used immediately by the AEM organization.
Over the longer term, many stakeholders believe an arm's length model would be better managed with stronger commitments to scientific and operational excellence.

Regarding data management, central functional management, regional operations management and executive leadership, the Working Group consistently ranked the arm's length model above the internal model. The AEM system will be challenged to provide excellent access to quality data and information in a user-friendly and transparent way, regardless of the organization model. Nonetheless, the Working Group concluded the Governance Board would establish clear expectations for the Executive Director and management team to deliver superior outcomes. The Working Group concluded that a qualified Governance Board would be focused on performance, measuring results and following up with the Executive Director to ensure positive outcomes.

The achievement of a world class science-driven monitoring agency will depend on effective scientific oversight and validation by the Science Advisory Board (SAB), as well as effective and relevant guidance by the Traditional Knowledge Advisory Panel (TKAP) and the Regional Advisory Panels (RAP). The scientific and academic community has expressed a strong preference for the arm's length model. Similarly, the Aboriginal communities have expressed support for an arm's length agency with useful mechanisms for aboriginal involvement. Previous and existing models, which are arm's length, have demonstrated the effectiveness of regional advisory panels. The Working Group concluded the arm's length model would rank higher than the internal model in fulfilling the roles of advisory functions because of access to the Governance Board if necessary.

3.4.1 Assessment by Ministerial Criteria

Table 3.2 presents a qualitative assessment of the arm's length and internal models, in terms of the ministerial criteria.

The Minister asked the Working Group to consider whether each structure would be clear and workable in the eyes of stakeholders. The Working Group concluded that the arm's length model would be superior in the eyes of external stakeholders; the internal model would be superior from the perspective of the existing government bureaucracy.

The Minister asked whether each structure would be able to develop strong relationships with key parties. The Working Group concluded that the internal model would develop stronger relationships within the Alberta government, while the arm's length model would develop stronger relationships with other stakeholders.

The Minister asked whether each organizational model could effectively manage the overall AEM system. The Working Group concluded that either model could manage most aspects of an AEM system; the arm's length model would attract superior scientific oversight and peer review. The internal model, having superior access to senior officials within other government departments and agencies, would have an advantage over the arm's length model in integrating its outcomes into the broader Alberta system of natural resource and environmental management.

The Minister asked which model would best deliver operational excellence during the set-up phase and over the longer term. The Working Group concluded that the internal system could get up and running more quickly, but the arm's length system would achieve a superior level of operational excellence over the longer term.

Finally, in terms of other Ministerial criteria including legitimacy, credibility, accessible quality data and independent science and peer review, the Working Group concluded the arm's length model would be the superior choice.

The Working Group concluded both models would operate under tight budgetary constraints. However, the Governance Board in the arm's length model could have an advantage in convincing government to flow funds secured from industry directly into the AEM system.

Recommendation 5:

An Arm's Length Agency

The Working Group recommends the AEM system be established as an arm's length agency, with a clear mandate, strong governance, strong leadership and a clear commitment to scientific monitoring. An arm's length structure with strong governance will most likely satisfy the key principles of legitimacy and credibility.

Table 3.2: Assessment of Organizational Models - Ministerial Criteria

Ministerial Criteria	Arm's Length Model	Internal Model
Clarity of Structure	◕	◕
Clear and workable to external stakeholders	●	◑
Clear and workable within the AB bureaucracy	◑	●
Relationships with Key Parties	◕	◑
With other AB government departments	◑	●
With the Government of Canada	◑	◑
With First Nations and Métis	●	◔
With current monitoring partners (WBEA *et al*)	◕	◑
With provincial and regional stakeholders	◕	◑
Effective Management of Overall AEM System	◕	◑
Coordination of industry & 3rd party activities	◕	◕
Coordination with regulatory compliance monitoring	◕	◕
Delivery of regional effects monitoring	◕	◕
Accessibility, quality & transparency of data	●	◔
Scientific oversight and peer review	●	◔
Effective allocation of scarce resources	◕	◕
Operational Excellence - Initiation Phase	◑	◕
Effective initiation of the AEM system	◑	◕
Satisfaction of AB government expectations	◑	◕
Satisfaction of stakeholder expectations	◕	◑
Operational Excellence - Long Term Operations	◕	◑
Effective operations, long term	◕	◑
Satisfaction of AB government expectations	◕	◕
Satisfaction of stakeholder expectations	●	◑
Other Ministerial Criteria		◑
Legitimacy and Credibility	●	◔
Delivery of accessible quality data	●	◑
Independent science & peer review processes	●	◔

Legend				
●	◕	◑	◔	○
Satisfactory		Neutral		Unsatisfactory

4 Sustainable Funding

The AEMP 2011 report recommended that "... a dedicated and sustainable funding model be established to support the work of the Commission. Alberta should use its legislative authority and negotiating power to determine which parties should share the cost of implementing the required monitoring, evaluation and reporting system."

The Working Group undertook a more detailed review of activities to be funded and potential sources of funding. The Working Group received advice on funding from environmental groups, academics, tax policy experts, industry associations, regulators, existing environmental monitoring groups and government officials. All agreed that the value of a world class environmental monitoring system for cumulative effects would require the consistent and reliable collection, evaluation and reporting of data and information over periods *measured in decades* rather than months or years. Monitoring data must be collected and interpreted consistently, in accordance with scientific best practice and without gaps in either quality or quantity.

The Working Group did not identify a significant difference in the quantum of funding required for an AEM system operating within government compared to an AEM system operating at arm's length from government. In either case, the bulk of funding would be directed to actual monitoring, evaluation and reporting activities; any differences in governance and management costs would probably be insignificant.

However, the Working Group did learn that industrial stakeholders would have a higher level of confidence in the fairness of revenue collection under the arm's length model, simply because there would be a better line of sight from certain funds collected to those funds expended under the more transparent arm's length model.

4.1 Funding Principles

Needless to say, a world class AEM system will require appropriate funding. The Working Group concluded that five general principles should guide the establishment of a viable funding model for the AEM system:

- AEM funding must be sufficient to support a science-based program commensurate with its mandate and in proportion to the level and scale of potential impacts being assessed. The AEM system must produce relevant information of real scientific value. High quality, credible and impartial information will facilitate open discussion and give the public confidence that environmental effects are well understood and being properly managed. Sufficient funding will ensure the AEM system is perceived as credible, relevant, and operationally excellent.
- AEM funding must be predicable, stable and sustainable. Environmental monitoring, evaluation and reporting are not one-time events, nor are they short-term activities. Cumulative effects monitoring must continue for many years to determine whether environmental changes are occurring, as evidenced by validated monitoring indicators. Furthermore, the quality of monitoring activities must be consistent, and produce reliable, replicable results, over the long term

- The AEM funding model should strive to achieve economic efficiency. To the extent possible, the costs of the AEM system should be borne by parties who are causing environmental effects and by those who derive economic benefits from the use of the environment. Costs allocated to various parties should reflect both the potential costs of environmental damage and the costs of environmental services, and should be allocated in a manner that does not distort normal economic forces.
- The AEM funding model should be fair and equitable. There are many parties that benefit from, and impose costs on, Alberta's environment. It will not always be easy to quantify and assign funding burdens. The funding model should be constructed to achieve a reasonable, or equitable, balance between numerous and varied sources of potential funding.
- The funding model should be administratively simple and cost effective. There are precedents for achieving this objective (e.g., ESRF NRBS, ABMI). All things being equal, a funding model that is easy to implement and does not itself generate significant administrative costs is preferable.

Recommendation 6:

Funding Principles

The Working Group recommends that AEM funding be commensurate with its mandate, supporting best in class environmental monitoring, evaluation and reporting in all regions of Alberta. Funding must be stable and sustainable over time. Funding mechanisms must be economically efficient, equitable and administratively cost effective.

4.2 Activities to be Funded

The AEM system will be a comprehensive, province-wide system organized on a regional basis aligning with the boundaries described in the Alberta Land Use Framework. Since certain regions described in the framework could be combined for monitoring purposes, the base budget for the AEM system must be sufficient to support the components for monitoring activities in five to seven regions of Alberta with centralized activities associated with evaluation, reporting and administration, including:

- Baseline monitoring system design, operation and maintenance;
- Effects monitoring system design, operation and maintenance;
- Evaluation of both baseline and effects monitoring data;
- Scientific inquiry relating to monitoring and evaluation activities;
- Data management and reporting system design, operation and maintenance; and
- AEM system start-up and ongoing management and administration costs.

Significant environmental monitoring activities are already underway in several regions of Alberta, managed by organizations such as the WBEA, the Lakeland Industry and Community Association, ABMI, and RAMP. Environment Canada has also initiated regional studies in 2012 in the oil sands region under the joint Canada Alberta Implementation Plan for Oil Sands Monitoring.

It is expected that the AEM system will audit and assess the quality and cost of third party programs with a view to understanding how best to coordinate, and thereafter manage or co-manage, these programs.

Many of these organizations receive funding from a variety of sources. During the initial transition period it is expected that the AEM system will audit and assess the quality and cost of third party programs with a view to understanding how best to coordinate, and thereafter manage or co-manage, these programs. However, the Working Group recognizes that several existing organizations do excellent, cost-effective work and it may be desirable to continue current arrangements, with funding provided through, or by, the AEM system.

Various departments of the Government of Alberta also undertake environmental monitoring (refer to Appendix C). The Working Group recognizes that many of these programs are well managed, cost-effective and valuable.

Establishing budgets for environmental monitoring in multiple regions of Alberta will not be an easy exercise. However, funding for start-up and early operations of the AEM system could be focused on monitoring in the Lower Athabasca region, which would serve as a pilot project for the province-wide system. Recent monitoring experience within the Lower Athabasca region suggests that $50 million annually may be required to fund baseline and effects monitoring (the Working Group suggests that the absence of a transparent environmental monitoring, evaluation and reporting system makes it hard to assess or evaluate the cost of these activities). Other regions could be expected to require significantly less monitoring activity. Furthermore, cost efficiencies and heightened scientific output could be expected to result from better regional coordination and inter-agency cooperation.

Certain parts of Alberta's broad natural resource and environmental management system will not be part of the AEM system and funding mechanisms for those programs are not expected to change. For example:

- Site-specific compliance monitoring, and related enforcement actions;
- Emergency management monitoring (e.g., monitoring of spills and emergency situations); and
- Management monitoring (e.g., data collection, analysis and reporting for flood forecasting).

4.3 Sources of Funding for the AEM System

The Government of Alberta has the ultimate responsibility for managing and sustaining the quality of Alberta's natural environment. While funding for the AEM system could originate with a variety of sources, it is recommended that all funds flow through the Government of Alberta, with no direct link between any single source of funds and specific monitoring programs. The flow of funding through the Government of Alberta will avoid perceptions of conflict between funding parties and the AEM system.

While funding for the AEM system could originate with a variety of sources, it is recommended that all funds flow through the Government of Alberta, with no direct link between any single source of funds and specific monitoring programs.

Potential sources of funds include:

- specific taxes or levies on sectors that benefit from or impose costs on the natural environment;
- a broad sustainability tax imposed on all consumers who choose to use potentially harmful goods or services;
- voluntary funding contributed by stakeholders in support of specific programs;
- allocations from specific natural resource revenue streams (NRR);
- the Alberta General Revenue Fund (GRF); and
- various combinations of the above.

4.3.1 Specific Taxes or Levies

In regions where environmental impacts arise from industrial point sources or other identifiable activities, funding for environmental monitoring, evaluation and reporting could be provided through specific levies applied to activities that have negative environmental impact, or emissions that cause impact. Levies applied to specific activities provide an administratively easy means of assigning costs to specific sectors, and different levies might be used to equitably share the costs of the AEM system. Examples include:

- a levy per barrel of bitumen produced at oil sands projects, during the production phase.
- a levy per barrel of recoverable reserves at oil sands projects, during the development phase.
- a levy per barrel of potential resource or per acre of oil sands landholding, during pre-development phases.
- similar levies as noted above for conventional oil and gas production and coal mining.
- a levy per tonne of GHG emissions, to cover the costs of air monitoring for bitumen upgraders, petrochemical plants, oil refineries and power plants.
- a levy per cubic metre of industrial water consumption, to cover the costs of water effluent monitoring at oil sands plants, petrochemical plants, oil refineries, power plants and other industrial users of water.

- a levy per cubic metre of domestic and commercial water consumption, to fund the monitoring of environmental impacts of domestic and commercial water consumption and sewage discharge.
- a tax per litre of road fuel consumption, to fund the monitoring of environmental impacts related to vehicles and transportation.

When considering potential taxes or levies, the Government of Alberta may consider that preference be given to those that provide an incentives to reduce consumption, reduce the intensity of emission, or reduce the intensity of environmental damage.

The ERCB is the primary regulator of oil, gas, oil sands and coal activity in Alberta. The ERCB funds its activities through a combination of specific levies on industrial activity, supplemented by somewhat variable funding from Alberta's General Revenue Fund. The ERCB funding model provides some useful precedents for collecting fees from the oil, gas, oil sands and coal sectors:

- All producing wells are charged a per-well annual fee depending on the rate of annual production. Fees range from about $170 per well per year to about $3,000 per well per year, depending on production rate. Note that both Crown and Freehold wells are subject to the ERCB levy.
- Oil sands operations and growth projects pay fees on the basis of a schedule set by the ERCB. The intent is full recovery of ERCB costs to regulate both existing operations and growth projects.
- Coal mines are levied a fee based on the tonnage of coal actually mined.

Total ERCB funding is approximately $160 million annually, provided by:

- Oil and gas well operators, $85 million
- Oil sands operators (mining and thermal), $30 million
- Coal operators, less than $2 million
- The Alberta General Revenue Fund, approximately $43 million.

The Government of Alberta collects billions of dollars annually from oil and gas operators, through royalties (as a percentage of production revenue), mineral lease rentals (per acre), property taxes (as a percentage of book value) and various user fees. This range of collection mechanisms provides many precedents for funding the energy industry's share of AEM system costs.

4.3.2 A Broad Sustainability Tax

Alberta could consider a broad environmental sustainability tax, levied through various means on all parties that benefit from or impact the environment. Such a tax could be similar to the specific levies described above, but applied to all parties rather than specific parties.

For example, a tax on all consumption of hydrocarbons could be set at a level sufficient to fund a wide range of sustainability programs, including the AEM system.

4.3.3 Alberta Natural Resource Revenue

Significant government revenue within Alberta is derived from the development and production of energy and other natural resources. This can be a relatively volatile source of revenue, dependent on production rates and commodity prices. Funding for the AEM system could be collected through a surcharge on royalties and other mechanisms already used to collect natural resource revenue.

4.3.4 Alberta General Revenue Fund

The Alberta General Revenue Fund (GRF) collects revenues from a wide variety of sources, including natural resource revenue, corporate taxes, personal taxes, and various fees and levies collected by the Government of Alberta. The GRF provides funding for the majority of government programs and services, with annual funding allocated through the government budget process. Allocations from the GRF reflect government priorities and may fluctuate over time.

Because every resident of Alberta uses and benefits from the environment to some degree, the GRF is probably the most administratively efficient way to fund environmental monitoring related to broad societal effects (for example, the environmental impact of municipalities such as Edmonton, Calgary and other cities and towns). However, the GRF is unlikely to be the most economically efficient, in that GRF revenue collection through income and other taxes will not provide incentives to reduce consumption, reduce the intensity of emissions, or reduce the intensity of environmental damage. In addition revenue collection through income and other taxes will impose fixed cost burdens on all Albertans, whether or not their activities are related to environmental monitoring.

4.3.5 Combinations

In regions such as the Lower Athabasca, the need for environmental monitoring is driven largely by industrial activities. In the regions around cities such as Edmonton and Calgary, the need for environmental monitoring is driven by the cumulative impact of thousands of smaller industrial and commercial facilities and millions of residents. In rural regions, the need for environmental monitoring might be driven by agricultural or forestry activities.

Some parts of Alberta need baseline monitoring before development activities become established. Levies based upon industrial activities are not well suited for these regions. Other regions, or sub-regions, have experienced significant extractive, or developmental, activities, with the contribution of any one industrial sector varying widely. For example, major industrial facilities located across the province include coal mines, gas plants, oil

sands developments, power plants and pulp mills. Appropriate sources and amounts of funding are therefore considered to vary significantly from region to region within Alberta.

Potential funding mechanisms that could apply to various industrial facilities and human activities are shown Table 4.1.

Table 4.1: Mechanisms for Funding Environmental Monitoring in Alberta

Industrial Activities	Funding Mechanisms							
	Levy/Unit of Production	Levy/Unit of Undeveloped Reserves or Acreage Held	GHG Levy	Water Consumption or Discharge Levy	Fuel Tax Levy	Broad Sustainability Tax	Natural Resource Revenue	General Revenue Fund
Oil Sands Mine Production	✓		✓	✓		✓		
Oil Sands Thermal (SAGD) Production	✓		✓	✓		✓		
Oil Sands Upgrading			✓	✓		✓		
Oil Sands Development		✓				✓		
Conventional Oil Production	✓		✓	✓		✓		
Conventional Sweet Gas Production	✓		✓	✓		✓		
Conventional Sour Gas Production	✓		✓	✓		✓		
Unconventional Gas Production	✓		✓	✓		✓		
Coal Mine Production	✓		✓	✓		✓		
Coal Mine Development		✓				✓		
Refineries and Petrochemical Operations	✓		✓	✓		✓		
Power Generating Stations	✓		✓	✓		✓		
Vehicles and Transportation					✓	✓		
Agriculture and Forestry						✓		✓
General Human Activity						✓		✓
Baseline Monitoring in Less Developed Regions						✓		✓
Early Stage Effects Monitoring						✓	✓	

4.4 Funding Mechanisms in the Lower Athabasca Region

The AEMP 2011 report recommended a phased approach to environmental monitoring, evaluation and reporting, with the initial focus on the Lower Athabasca region.

The dominance of oil sands production and development activities in the Lower Athabasca region suggests that the majority of costs should be covered by levies on oil sands development and production activities (Figure 4.1). For example, the following levies could be considered to raise $50 million of annual funding for Lower Athabasca regional environmental monitoring:

- $40 million from oil sands producers. At a production rate of two million bpd, a levy of less than six cents per barrel would raise $40 million annually.
- $5 million from oil sands developers. For every billion barrels of potential resource under development, a levy of one-half cent per barrel of developable resource would raise $5 million annually.
- $5 million from GRF, to reflect the regional impact of broad human activity.

Discussions with a wide range of Lower Athabasca stakeholders suggest general support for this sort of funding model in the Lower Athabasca region.

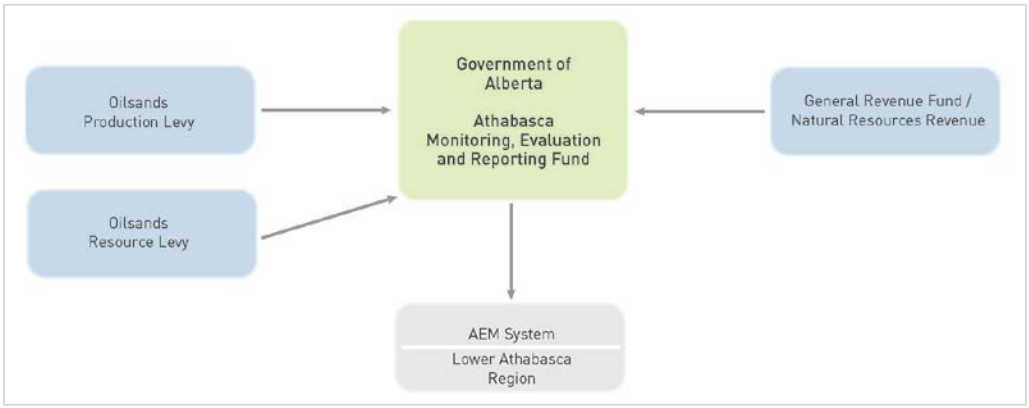

Figure 4.1: Potential Funding Model: Lower Athabasca Region

4.5 Funding Mechanisms in Other Regions of Alberta

Unlike the Lower Athabasca, other regions of Alberta do not have single industries that dominate the region. In the South Saskatchewan region, for example, major environmental impacts could result from agriculture, conventional oil and gas, transportation and the large urban population of Calgary. A $20 million AEM system could reasonably be funded through specific levies on hydrocarbon consumption and water use (Figure 4.2). Levies on hydrocarbon consumption and water use could be appropriate in most regions of Alberta. Large forestry operations in northern Alberta are also large consumers of diesel and other fuels; large refineries and other processing operations in the North Saskatchewan watershed are large consumers of energy and large users of water.

Once established, the AEM system should complete an analysis of energy and water consumption and related environmental impacts in each region of Alberta, to quantify the funding that could be raised through the application of such levies.

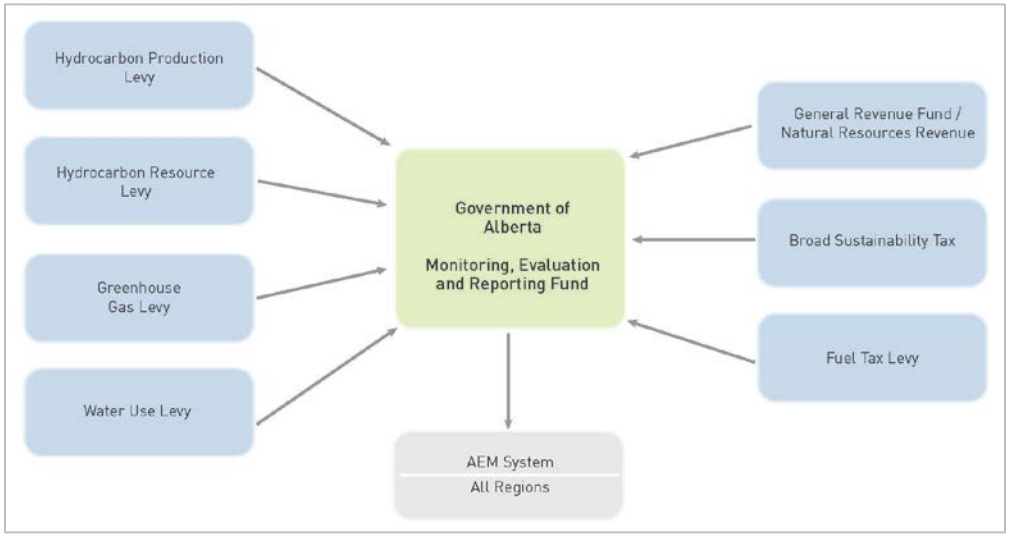

Figure 4.2: Potential Funding Model For All Regions

Recommendation 7:

Funding Mechanisms

The Working Group recommends that funding for the AEM system be collected from large point-source emitters and from the general public. Funding from large emitters could be collected through levies on energy production, energy development, water consumption, hydrocarbon combustion and GHG emissions. Funding from the general public could be collected from levies on water consumption, fuel consumption, a broad sustainability tax and through the General Revenue Fund.

Recommendation 8:

Flow of Funds

The Working Group recommends that all funding be collected by the Government of Alberta and dedicated to for the AEM system, to avoid any perception that AEM activities are directly funded by interested parties. Funding for all environmental effects monitoring and research programs should flow through the AEM system to ensure that third party activities are well managed and focused on AEM objectives.

Recommendation 9:

Phased Implementation by Region

The Working Group recommends that initial funding of the AEM system be focused on improving monitoring programs in the Lower Athabasca region. The Lower Athabasca should serve as a first step, or pilot project, for the province-wide AEM system.

Implementing the Alberta Environmental Monitoring System

5

The AEMP 2011 report recommended the AEM system be established as a pillar of Alberta's natural resource management framework, alongside regional land use planning, an enhanced energy regulatory process and cumulative effects management. The Working Group supports this recommendation and believes such an approach would facilitate a high standard of environmental stewardship across the province.

A great deal of work will be required to implement the new AEM system, regardless of the organizational model selected. The magnitude of challenges associated with the creation of an arm's length public agency is perhaps easiest to imagine, but one should not downplay the scale of change required to build a world class AEM system within government. This too would require a substantive departure from the status quo as a more science-based organization is developed, as monitoring expands from its current emphasis on compliance, as more robust and transparent data and information management and communication systems are developed, and as monitoring, evaluation and reporting activities from across government ministries, non-government agencies, industry, and academia are identified, assessed, coordinated, and integrated.

Without a clear, strong, and timely statement from government about its intentions, there is considerable risk that current debate will become even more polarized. A decision to implement an arm's length public agency would itself be a strong statement and would set in motion the steps required to implement the agency. Should government decide to implement the new AEM system within government, then clarity about how this differs from the status quo will be required to ease concerns. Regardless of the organizational model selected, clarity of intentions will be required to recruit the leadership team, provide them with the political support they require, ensure that potential players and partners are working towards the same outcome. The new AEM system will develop and evolve over several years; the time to begin is now.

The new AEM system will develop and evolve over several years; the time to begin is now.

Recommendation 10:

Launching the AEM Organization

The Working Group recommends that funds be provided immediately to launch the AEM organization, including the formation of the Governance and Science Advisory Boards.

5.1 A Phased Approach to Regional Monitoring

The credibility and trustworthiness of environmental monitoring information will be vital to the maintenance of Alberta's social license to develop and regulate its resources.

The Alberta Land Use Framework calls for the government to establish seven land use regions and develop a regional plan for each. The seven regions are based on major watersheds, with boundaries adjusted to align with municipal boundaries (Figure 5.1).

As indicated above, implementation and organization of monitoring, evaluation and reporting activities in the Lower Athabasca region is a matter of urgency. Alberta must move quickly to better assess cumulative effects in the oil sands region. This is not solely a consideration of scientific data collection – the cumulative impact of multiple developments in the oil sands region is of concern to federal and provincial policy-makers, regulators, industry, environmental advocates, regional stakeholders and the general public. The credibility and trustworthiness of environmental monitoring information will be vital to the maintenance of Alberta's social license to develop and regulate its resources.

5.1.1 Initial Focus on the Lower Athabasca Region

The organization of environmental monitoring along land use boundaries would allow the AEM system to commence operations in the Lower Athabasca region, optimize operating procedures and engage stakeholders within that region, and subsequently repeat the process in other regions of Alberta.

Establishing the AEM system as a pilot project in the Lower Athabasca region will give the entire organization experience that could be applied to other regions of Alberta.

Establishing the AEM system as a pilot project in the Lower Athabasca region will give the AEM management team experience and credibility. Key governance and organizational roles would be established, management and operating teams would grow in their roles, and advisory boards would develop their working priorities and procedures. Once the organizational structure is established the AEM system would focus on coordination of activities with existing monitoring organizations, to collect and validate environmental information. As gaps and overlaps in the existing programs are identified, the AEM system would become more efficient as existing activities are redirected and new programs are implemented.

In short, the entire organization would gain experience that could be applied to other regions of Alberta.

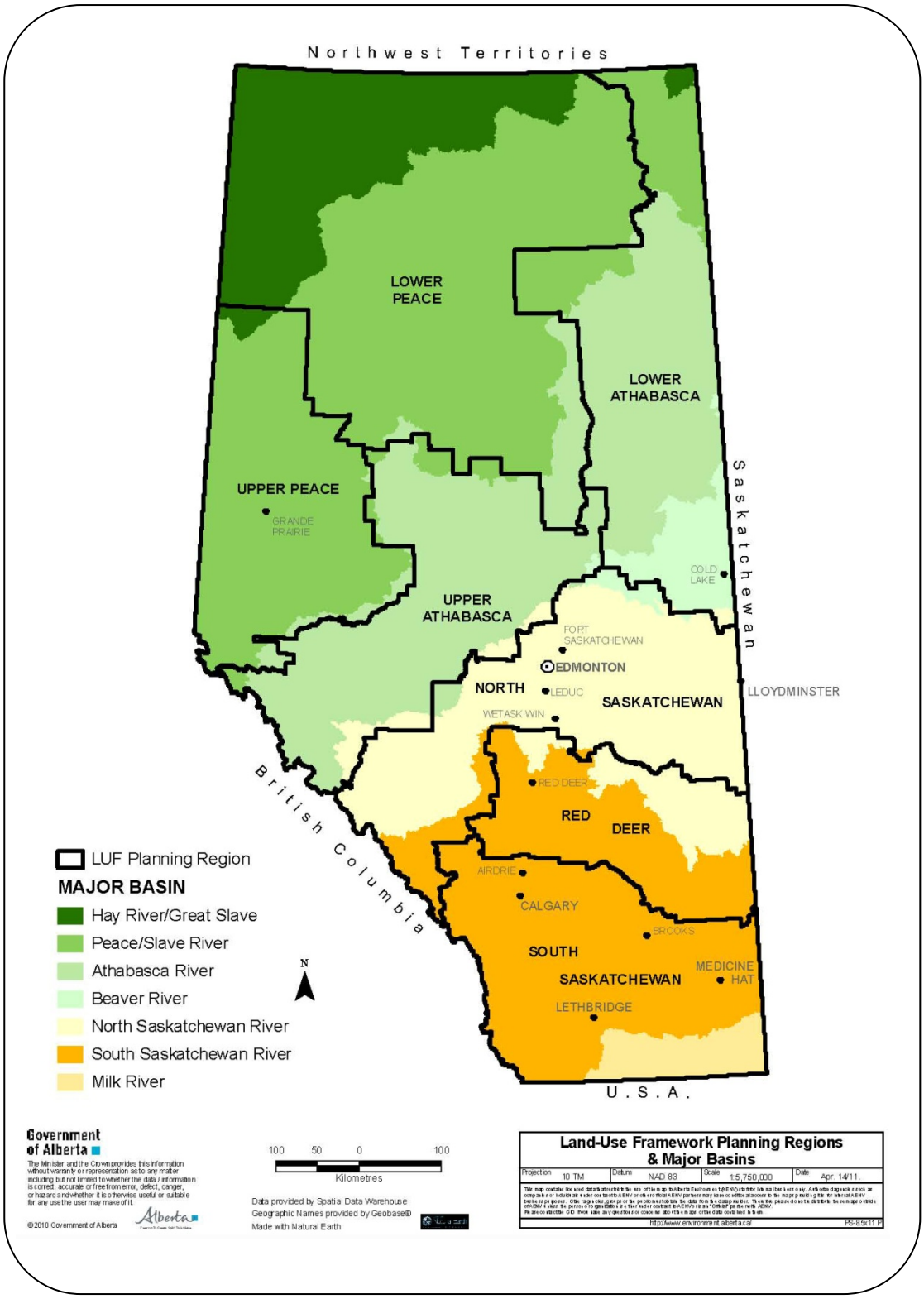

Figure 5.1: Alberta Land Use Regions

5.1.2 Remaining Six Land Use Regions

The AEM system needs to adapt to the wide range of human activity occurring across the province. Each land use region will have its unique challenges. The AEMP 2011 report recommended that preliminary plans for establishing operations in the remaining regions be developed in the first two years of AEM system operations, with the intent of having the province-wide, science-based environmental monitoring activities established within five years.

As noted in AEMP 2011 report, the first step to expanding the AEM system to the remaining six land use regions is to complete an inventory and audit of all the bodies and agencies involved in monitoring within Alberta. An evaluation of the current commitments and monitoring activities undertaken by governments, industries, and other organizations will provide the foundation to design, coordinate, and fund an appropriate AEM system for each of the land use regions.

As monitoring activities are expanded to other regions it could make sense to combine certain regions for environmental monitoring purposes.

5.2 Phased Implementation of an Arm's Length Agency

The Working Group recommends the interim Executive Director continues to operate within government, and also recommends a parallel process to establish the arm's length agency.

The near-term implementation of environmental monitoring in the Lower Athabasca region will require significant management and organizational support. While the Working Group recommends the arm's length model, it recognizes that establishing a new arm's length agency in a top down manner could take several years.

The Working Group commends the Minister for appointing an interim Executive Director to accelerate the implementation of a monitoring evaluation and reporting program for the Lower Athabasca region. The Working Group recommends the interim Executive Director continues to operate within government, until the arm's length agency is established.

The Working Group also recommends a parallel process to establish the arm's length agency. As a first step, it is recommended that the Minister appoint the Chair of the Governance Board for the AEM system. Working with the Chair, the Minister would identify and appoint inaugural members of the Governance Board.

As recommended in the AEMP 2011 report[33], the Governance Board would be composed of respected individuals from diverse backgrounds and sectors, chosen on the basis of merit, with skills, knowledge and experience related to environmental monitoring, evaluation and reporting. The following discussion on the Board Chair and recruitment and appointment of Board Members follows the AEMP 2011 report:

[33] A World Class Environmental Monitoring, Evaluation and Reporting System for Alberta – The Report of the Alberta Environmental Monitoring Panel, June 2011. Section 5.5.

Board Chair

With direction from the Board, the Chair represents the Board and the agency in dealing with Ministers, provincial and federal departments, stakeholders and Albertans. The Chair provides leadership to the Board and effectively facilitates the Board's work.

The Board Chair is responsible for:

- ensuring the arm's length agency operates within the terms of its roles and mandate statement, working to satisfy the long term objectives agreed with the Minister;
- overseeing and ensuring the performance of the Executive Director and the senior leadership team;
- planning and managing Board meetings;
- providing the Minister with regular updates on the agency's operations and informing the Minister regarding emerging issues;
- administering the Code of Conduct and ensuring that conflict of interest matters are addressed by the Board;
- ensuring the Board conducts an annual evaluation of its own performance; and
- monitoring the effectiveness of the Board and, where necessary, recommending to the Minister the removal of a Board member where cause exists.

Recruitment and Appointment of Board Members

The Board will prepare a competency matrix for the board as a whole and will determine the values and competencies required for individual directors. Areas of competence include but are not limited to those noted below:

- Technical operations and management
- Financial experience and acumen
- Human resources and organization
- The science of environmental monitoring
- Working in or with government
- Strategic planning
- Board governance

The recruitment process will be led by the Minister. For the appointment of the initial Chair and Board members, it is expected that the positions would be publicly posted and that worthy candidates who apply, or are nominated, will be vetted by the Ethics Commissioner. When the Board is operational and a vacancy occurs, the Board will identify the competencies required and provide that profile to the Minister who shall initiate an appropriate process to fill the position, which includes vetting by the Ethics Commissioner. The Minister and the Board Chair will discuss the appointment of individual candidates before the Minister makes the official appointment.

The Working Group expects it would take about twelve months to establish an arm's length agency, at which time the internal organization established under an interim Executive Director would transition to the new agency.

The Working Group envisions three distinct phases of implementation for the arm's length model (Figure 5.2):

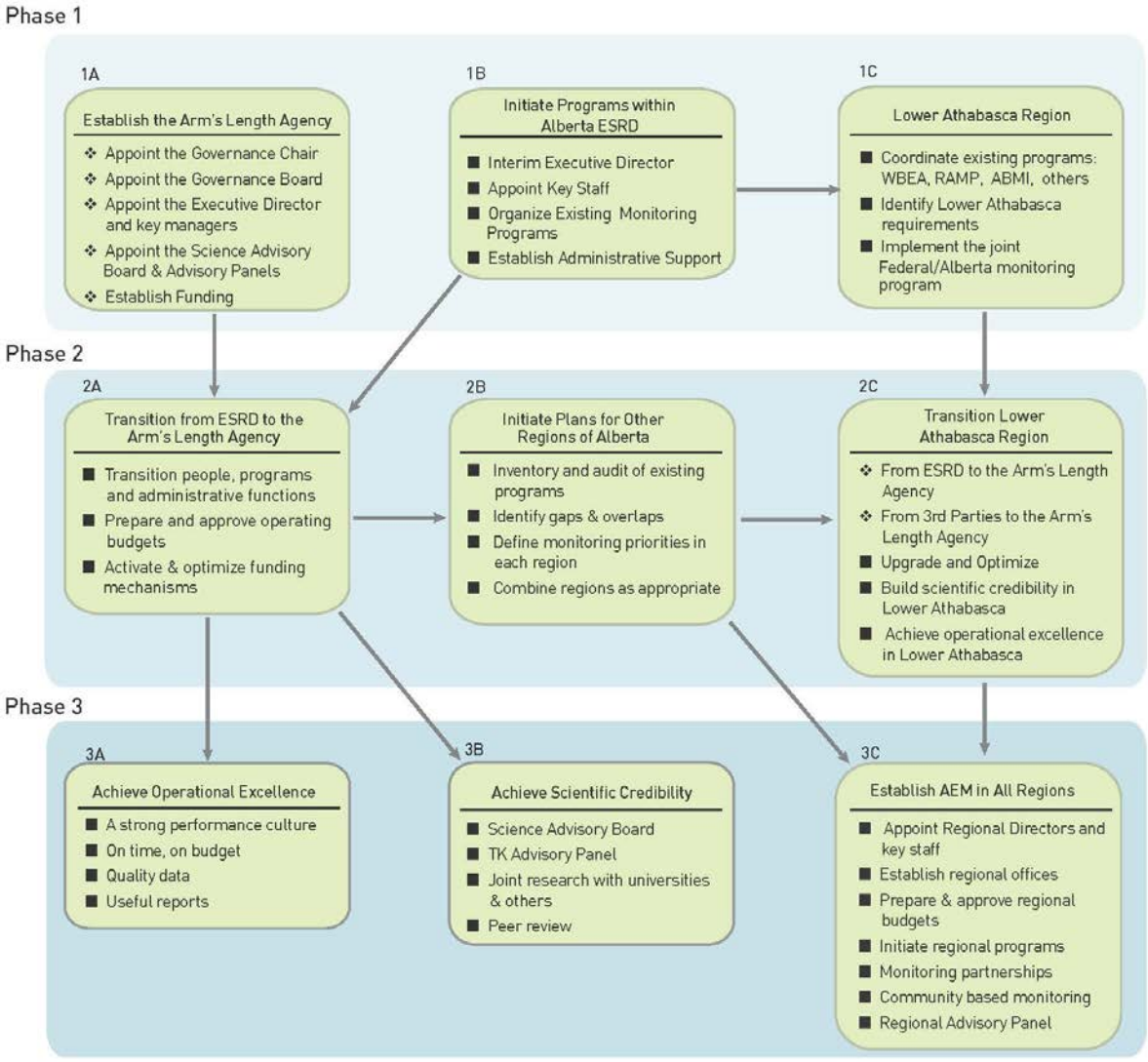

Figure 5.2: Phased Approach for Implementation - Arm's Length Model[34]

[34] Most activities in Figures 5.2 and 5.3 are the same for both models. Differences are shown with a ❖

Phase 1A: Establish the arm's length agency through the appointment of a board chair, board members, the Executive Director and key managers. Establish working facilities and prepare to launch the new arm's length agency. Select and appoint the initial Science Advisory Board and advisory panels. Work with the Minister to establish funding levels and mechanisms.

Phase 1B: Accelerate the development of a working organization through the appointment of an interim Executive Director and working team, resident within Alberta Environment and Sustainable Resource Development. The interim team would focus on monitoring in the Lower Athabasca region, evaluating existing monitoring programs and preparing those programs for transition to the new agency.

Phase 1C: Coordinate existing programs in the Lower Athabasca region and undertake a gap analysis to identify required changes in those programs. Play the lead Alberta role in implementing the Joint Canada-Alberta Implementation Plan for Oil Sands Monitoring.

Phase 2A: During the second year all people, programs and administrative functions would transition from ESRD to the new arm's length agency. Governance functions would be fully in place, and a roles and mandate statement would be agreed upon with the Minister. Operating budgets and funding mechanisms would also be agreed upon with the Minister. The new agency would be "up and running".

Phase 2B: The Executive Director would lead the development of monitoring plans for other regions of Alberta. Regions outlined in the Land Use Framework could be combined for monitoring purposes, where appropriate.

Phase 2C: The Lower Athabasca programs would be in-place within the new agency. Programs would be upgraded and optimized as appropriate, building scientific credibility and driving for operational excellence within the Lower Athabasca region.

Phase 3A: The new arm's length agency would develop a strong performance culture under the leadership of a strong Executive Director and engaged management team. The agency would be admired for its achievement of operational excellence, delivering high quality data and reports on time and within budget.

Phase 3B: The new arm's length agency would achieve credibility with a wide range of stakeholders. The SAB and various advisory panels would be fully operational, peer review processes would be in place and the agency would undertake joint research into environmental monitoring issues with universities and others.

Phase 3C: The new arm's length agency would establish well organized environmental monitoring programs in all regions of Alberta.
The Working Group expects each phase would require 12 to 24 months, as part of a five year process to fully develop the AEM system.

Recommendation 11:

Phased Implementation of an Arm's Length Model

The Working Group recommends that an arm's length AEM system be established in three phases over a five year period:

- Lower Athabasca monitoring programs and the new agency would be initiated on parallel paths during Phase 1.
- Lower Athabasca programs would transition from ESRD to the new agency in Phase 2.
- Province-wide programs, full operational excellence and scientific credibility would be established in Phase 3.

5.3 Implementation of an Internal AEM Organization

The Working Group considered how best to implement an internal-to-government organization should government choose this as its preferred option. The Working Group concluded that a highly focused, coordinated and integrated AEM organization reporting to the Minister of ESRD would be the best means of delivering an internal to government AEM system.

As with an arm's length organization, it could take 12 to 24 months to get a new internal AEM organization up and running effectively. To accelerate activities in the Lower Athabasca region, the Working Group commends the Minister for appointing an interim Executive Director to manage Lower Athabasca monitoring activities until the internal AEM organization is up and running.

The Working Group envisions three distinct phases of implementation for an internal AEM organization, as shown in Figure 5.3. These phases are essentially the same as those of the arm's length model; refer to the descriptions above.

Existing government administrative systems (e.g., information technology, finance, human resources, communications) would support an internal AEM organization. The Working Group understands that an internal AEM organization would fit well with existing government structures; however, the Working Group sees significant advantages with the arm's length model (refer to Recommendation 5).

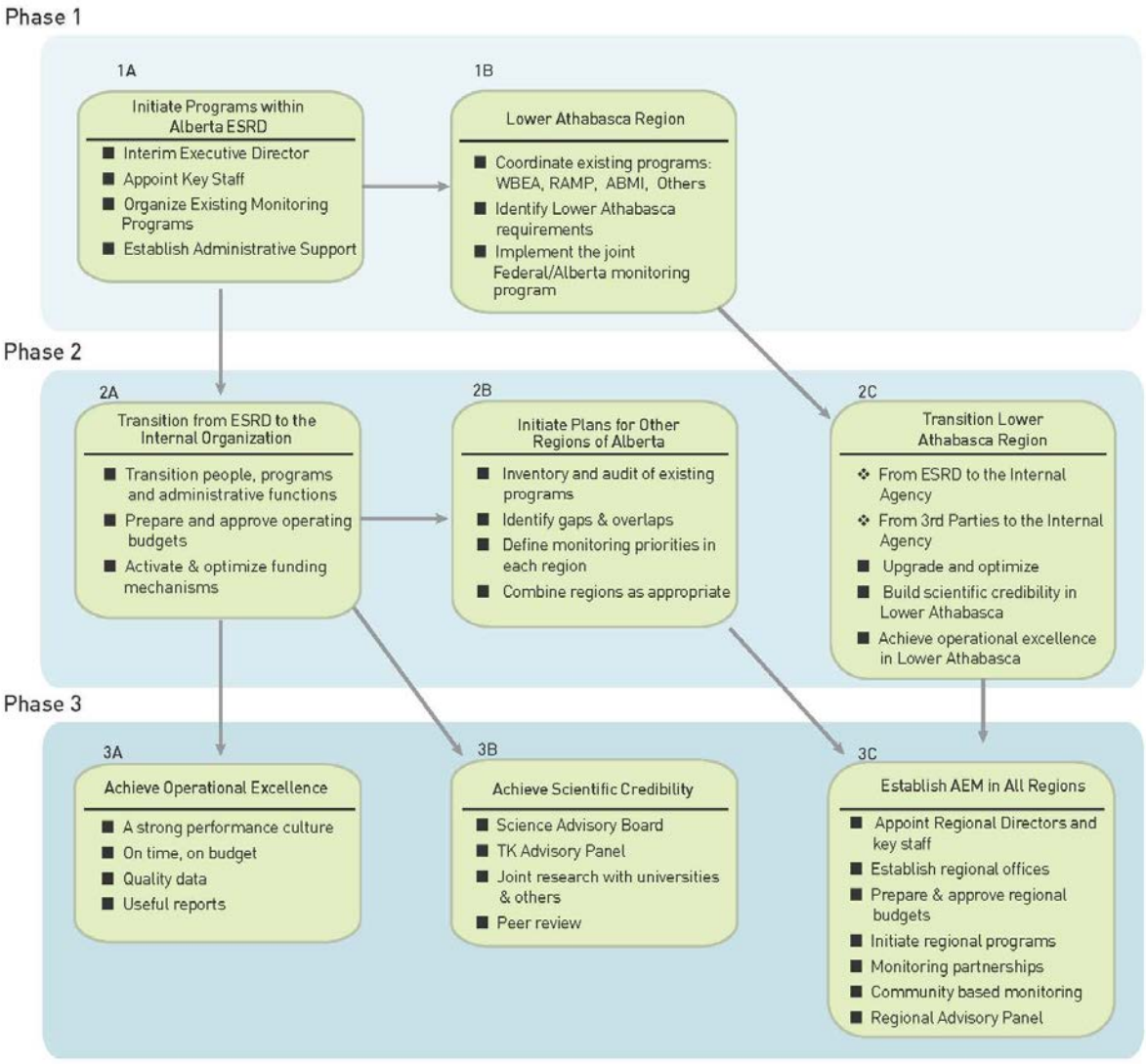

Figure 5.3: Phased Approach for Implementation - Internal Model[35]

5.4 Inter-Governmental Cooperation and Coordination

The Working Group considers inter-jurisdictional cooperation and coordination to be an essential element for successful implementation of the AEM system. Federal, provincial and territorial jurisdictions bordering Alberta will have to be considered. Canada has recently announced policy initiatives, including a new act for the Canadian Environmental Assessment Agency (CEAA) to streamline federal environmental assessment processes for major projects in part aimed at achieving better co-ordination with provincial counterparts[36].

[35] Most activities in Figures 5.2 and 5.3 are the same for both models. Differences are shown with a ❖

[36] Canada's Economic Action Plan 2012. www.actionplan.gc.ca.

The Government of Canada has various responsibilities for aboriginal peoples and the environment derived from legislation such as the *Canada Fisheries Act*, the *Canadian Environmental Protection Act*, the Canada *Water Act*, the *Species at Risk Act*, the *Navigable Waters Protection Act* and the *National Parks Act*. If effective and efficient monitoring is to be achieved, the federal and provincial governments will have to cooperate. As noted in the AEMP 2011 report, the future AEM system should also take advantage of scientific resources residing within various agencies, universities and private sector entities across Canada to build the scientific capacity needed to achieve a world class system.

Several recent announcements provide a framework for increased cooperation and collaboration. In February 2012, Canada and Alberta announced The Joint Canada-Alberta Implementation Plan for Oil Sands Monitoring to set out a "scientifically rigorous, comprehensive, integrated and transparent environmental monitoring program for the region".[37] This is a three year partnership to improve monitoring in Alberta's oil sands region. It is anticipated by the Working Group that any program elaborations, or subsequent agreements, between Alberta and Canada would enable the AEM system to manage all environmental monitoring programs in the Lower Athabasca region.

Recommendation 12:

Alberta-Canada Coordination and Cooperation

The Working Group recommends the AEM system lead and manage all environmental monitoring programs in the Lower Athabasca region.

5.5 Stakeholder Involvement

The Working Group discussed implementation with various external stakeholders including aboriginal groups, scientists and academic leaders, and industry operators. While all stakeholders have a mutual interest in science-driven, credible and transparent environmental information, several expressed interest in, and concern about, how their interests would be accommodated in the structure of the AEM system. Input provided to ESRD noted that while the creation of a centralized agency or commission that is powered by the involvement of the stakeholders is critical two cautionary factors were cited: while scientific rigor and independence with accountability is crucial to the entity's integrity, authority and reputation at home and worldwide, there is a natural tension between scientific rigor and participatory involvement that would need acknowledgement and careful management. Second, there is recognition that there is no "one size fits all" for all regions of Alberta and that a distributed delivery model would need to be developed that addresses the unique needs of each of the regions.[38]

All stakeholders have a mutual interest in science-driven, credible and transparent environmental information.

Accordingly, the following sections discuss specific implementation needs for several of the stakeholders.

[37] Environment Canada News Release. February 3, 2012. Canada and Alberta Take Action to Implement World Class Monitoring System for the Oil Sands.

[38] Information provided to ESRD subsequent to the AEMP 2011 report.

5.5.1 Science Functions and the Science Advisory Board

5.5.1.1 The Role of Science

Some activities associated with environmental monitoring will become repetitive over time. Maintaining quality and consistency demands a businesslike approach. Nonetheless, the AEM system must be built upon a foundation of high quality science, and work to both build and maintain scientific credibility in all its monitoring, evaluation, and reporting activities. Scientific credibility will be critical to the long-term success of the AEM system in many different ways; as such it should be nurtured in many ways.

Scientific credibility will be critical to the long-term success of the AEM system.

The Working Group set out three key elements that must be present to achieve these goals:

- Scientists would be contracted or employed within the organization in key positions with responsibilities for design and implementation of science-based monitoring, evaluation and reporting activities;
- Means are developed to inform current monitoring, evaluation and reporting practices through targeted research that itself is tested through a credible, peer-reviewed process; and
- A Science Advisory Board (SAB) would be created to provide peer review and third party advice from credible sources. Furthermore, the consideration of such advice becomes part of the management culture of the AEM system.

Without prejudging the nature of organizational structures, well-trained scientists with strong credentials must be appointed to key positions with the authority and mandate to ensure the development of a strong science culture that is free from bias and perception of bias.

These scientific leaders should also be charged with the responsibility for ensuring all evaluation and reporting activities respect the government's unique authority to formulate policy, establish regulations, enforce compliance, and ensure public safety.

From time to time, the Government of Alberta may wish to engage the science capacity of the AEM system to provide public or private comment on established policy, regulations, enforcement or safety, or to provide alternative options for consideration, including advice on management or risk assessment. Such activities should be guided by explicitly documented roles, responsibilities, and expectations that do not place the independence of the AEM system at risk.

5.5.1.2 Informing monitoring practices through targeted research

Even within an established and mature monitoring program, there is a need to continuously evaluate the suitability of monitoring, evaluation, and reporting activities and adjust them to changing times, conditions, and technologies. The AEM system will need to be proactive in identifying future trends and challenges that in some cases may be unique to its jurisdiction. This will require research activities that are targeted to specific outcomes.

While there is potential to leverage the expertise and resources of other research institutions, the organization will need to have both the expertise and resources to engage appropriate partners and direct shared outcomes.

In effect, scientific leaders within the organization will be expected to perform science, collaborate with scientists external to the organization, and make use of scientific knowledge derived from the international scientific community.

5.5.1.3 The Role of the Science Advisory Board

There appears to be widespread acceptance of the need for a SAB to provide peer review and independent, credible, expert, and strategic advice relating to the performance of the AEM system, emerging scientific and technical issues, trends, and forward-looking activities including research and development of scientific knowledge. This review and advice should serve to validate and augment the advice and guidance provided by scientific expertise within the organization, not to substitute for it.

The SAB would be empowered to serve the AEM system by providing review and advice on a range of matters including, but not limited to:

- the overall design, quality, and scientific credibility of the monitoring, evaluation and reporting system;
- the relevance of specific monitoring, evaluation and reporting activities;
- emerging trends and opportunities;
- potential gaps in the system;
- potential partnership or alliances to advance monitoring, evaluation and reporting activities;
- impact and adequacy of research efforts and partnerships;
- assessment of productivity and performance relative to peer organizations; and
- freedom from bias.

The Science Advisory Board should provide periodic scientific and technical audit and assessment of the AEM system and its focus on future opportunities and challenges.

In essence, the SAB should provide periodic scientific and technical audit and assessment of the AEM system and its focus on future opportunities and challenges. The SAB should be free to respond to the organization's requests for specific review and advice, and to play a role in setting its own agenda. Whether it is acting proactively or reactively, the SAB should be structured to operate free from influence or imposition. Membership should be approved by the Governance Board and adjusted periodically to ensure a proper balance of competencies.

SAB members should largely be independent from both government and relevant industries and should be selected to ensure freedom from bias. SAB members should serve as individuals in a personal and professional capacity on the basis of their expertise. They should not represent organizations, employers, professions, or

constituencies and could not receive instruction from any person external to the SAB in order to inform their advice. Each would have an obligation to act in the public interest. The SAB will meet at least once a year (more frequently at the outset) to review activities of the AEM system as described and documented in written and verbal reports from the organization. The SAB will provide advice on an annual basis in a written communication to the Executive Director, copied to the Board of Directors, and made available through the organization to the public. Such communications should illustrate issues of consensus and substantive issues where which consensus is not achieved.

The Executive Director will provide the Governance Board with an assessment of the annual report of the SAB and the response of the organization to the advice provided.

5.5.2 Traditional Knowledge Advisory Panels to the SAB

There are examples of successful incorporation of aboriginal concerns, interests and participation in regional-scale monitoring programs. An early example was the Northern River Basin Study (NRBS) that incorporated aboriginal leaders on the Study Board and established a separate and distinct Traditional Knowledge study program, which was developed and maintained in parallel with ongoing scientific research programs.

Long-term monitoring programs that are valued incorporate traditional knowledge and include the participation of local communities.

Close communication and coordination between the activities of the TKAP and the SAB will be important within the AEM system. Working together, these groups will be responsible for developing and implementing community-based monitoring programs.

There are long-term monitoring programs that are valued by northern communities because they incorporate traditional knowledge and include the participation of local northern communities, such as:

- Independent Environmental Monitoring Agency for BHP Billiton Canada Ekati Diamond Mine (NWT)[39];
- Environmental Monitoring Advisory Board for the Diavik Diamond Mine (NWT)[40];
- Snap Lake Environmental Monitoring Agency (NWT)[41];
- Peace-Athabasca Delta Environmental Monitoring Program (AB)[42]; and
- Slave River and Slave River Delta Community-based Monitoring part of the NWT's Water Stewardship Strategy and its Plan for Action (2011-2015)[43].

[39] http://www.monitoringagency.net/.
[40] http://www.emab.ca/.
[41] http://www.slema.ca.
[42] http://www.wlu.ca/documents/42036/16_Stuart_McMillan_PC.pdf.
[43] http://www.enr.gov.nt.ca/_live/pages/wpPages/water.aspx.

5.5.3 Initiatives in the Lower Athabasca Region

In March 2012, Alberta Premier Alison Redford, announced a $3 billion government-funded research agency that would resemble the former Alberta Oil Sands Technology and Research Authority (AOSTRA). A funding commitment of $150 million annually for 20 years was earmarked for the new agency, nicknamed "AOSTRA-2"[44]. The initiative is aimed at boosting the non-renewable energy industry's environmental performance while encouraging research into new technologies. It could also provide a strong incentive for improved monitoring performance.

The Working Group considers cooperation within industry to be an essential element for successful implementation of the AEM system. In some cases, such cooperation can result in voluntary funding to support specific environmental programs. For example, in 2008, a collaborative network between ConocoPhillips, Nexen, Shell, Statoil, Suncor and Total formed the Oil Sands Leadership Initiative (OSLI). Their mission is to lead the oil sands industry in the responsible development of Alberta's bitumen resource by taking action to improve the environmental, social and economic performance of Alberta's oil sands. The OSLI budget has grown to $25 million in 2011 with four member-driven working groups. Notably, the budget does not include the time donated by company staff to support OSLI, which is estimated to be in excess of 30 full-time-equivalent positions per year with a dedicated Executive Director and office staff.

The developing AEM system provides an opportunity for Alberta-based technology firms to develop and apply world class environmental services.

Subsequently in March 2012, a coalition of oil sands producers announced the creation of the Canada Oil Sands Innovation Alliance (COSIA)[45]. COSIA is structured to allow various corporations to share and cooperate with research and technology development in key areas of industrial environmental performance.

5.5.4 Existing Data Collection and Environmental Monitoring Organizations

It is assumed that during the phased development of the AEM system existing environmental monitoring organizations will continue to operate while AEM system becomes established. Cooperative and integrative arrangements would have to be made between the AEM system and these existing organizations, province-wide.

5.5.5 Consulting and Information Technology Organizations

The developing AEM system provides an opportunity for Alberta-based technology firms to develop and apply world class environmental services. Several consulting and technology companies presented concepts and examples to the Working Group of how their current activities could support the implementation of the AEM system. These companies see opportunities for innovation and the potential expansion of their services to the global marketplace. All companies recognized the implementation of AEMS will require a collaborative approach, drawing on the capabilities and expertise of many different organizations across the province.

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[44] Edmonton Journal 28 March 2012.

[45] Canada Newswire Article 1 March 2012. http://www.newswire.ca/en/story/930687/canada-s-oil-sands-producers-launch-environmental-performance-alliance.

For example, Alberta Innovates Technology Futures (AITF) has the responsibility to meet the research and innovation priorities of the Government in agriculture, forestry, energy, the environment, and health. AITF employs 600 scientists and professionals who operate laboratory, pilot plant, and scale-up space across the province. AITF, ABMI, and other organizations have expressed a willingness to work cooperatively with other partners to help develop and implement an AEM system, even if this requires evolving into a new entity with a modified structure.

6 Concluding Remarks

The Working Group was tasked with providing expert advice, viable options and recommendations to the Minister of Environment and Sustainable Resource Development for the governance and funding of a new provincial AEM system.

In many ways, Alberta is approaching a crossroads in its history. Global demand for our energy resources has spawned new industries that are fuelling population growth and driving our provincial economy. The scale and pace of development have generated debate throughout our province with a rapidly changing information landscape that has focussed international attention on issues relating to the integrity and quality of Alberta's environment. At times, the debate has become polarized, accentuated by political and advocacy interests that are based on differing viewpoints and agendas. In such a polarized environment, Albertans need to know the facts about their environment. They also need to have confidence that decision-makers are using sound scientific information to achieve the highest standards for environmental management and protection.

Alberta has taken positive steps forward, as exemplified by the recent implementation of a regional land use framework for the province that is based upon the principles of cumulative effects management. This framework provides a natural architecture for a new science-based, arm's length and transparent AEM system. Albertan's desire and deserve a world class AEM system that provides a balanced, responsive and accountable measure of the state of our environment that is deployed progressively, constructively and cost-effectively in concert with other governments, industry, communities and the interested publics. Built upon principles of legitimacy, credibility, relevance and operational excellence, the new AEM system can be implemented in a way that fosters stakeholder trust through aboriginal and local participation.

An arm's length, public agency has the highest probability of acceptance and success.

The Working Group recognizes that there can be no guarantees that a new AEM system will automatically achieve all the goals and objectives set for it. This is true regardless of the organizational model chosen for the AEM system. Much will be determined by the capable work, dedication and effectiveness of the leaders, managers and scientists that are tasked with the challenge. Nonetheless, the Working Group concludes that an arm's length, public agency has the highest probability of acceptance and success. The very creation of such an agency will signal our strong intention as a Province to establish a world standard for environmental monitoring, evaluation and reporting.

Appropriate, sustained and reliable funding will be required to establish the new AEM system and support its mandate, which is why the Working Group has recommended a phased approach to implementation. A phased approach will support the responsible and progressive development of a reliable, capable and growing world class AEM system. Operational and scientific experience gained through an initial focus on the oil sands region will be progressively transferred throughout Alberta.

A phased approach will support the responsible and progressive development of a reliable, capable and growing world class AEM system.

The Working Group is mindful that credible scientific data and information will be essential to building trust in the new AEM system. A focus on full and open disclosure will inform national and international dialogue and enhance our social license to regulate and manage our resources.

The implementation of such an AEM system could provide material economic, technological and scientific growth opportunities for the private and academic sectors of Alberta. A world class, province-wide, AEM system will encourage further development of innovative Alberta technologies with potential world-wide applications.

As we approach this important, indeed historical crossroad, Alberta has an opportunity to achieve global leadership in resource management and environmental protection. Let us seize the moment!

Acknowledgements

The Working Group thanks its support team of Bob Barraclough, Judy Bennett and Jacqueline Desrochers, whose unfailing professionalism met the high standards and tight timelines necessary to complete this report.

Numerous individuals and organization representatives met with the Working Group to share their experience and knowledge on science-based monitoring programs, community-based monitoring programs, organizational structure, governance and funding. The Working Group profited greatly from the advice and guidance of the following individuals, and we thank them for their participation.

- Alberta Innovates Technology Futures (S. Lougheed, R. Goebel, M.P. Barry, K. Wirtanen, R. Wayken, B. Lakeman, L. Roy, C. Aumann, Q. Goretzky, A. Tesorio)
- Alberta Biodiversity Monitoring Institute (K. Andries, J. Herbers)
- Canadian Association of Petroleum Producers (D. Collyer, D. Pryce, G. Stringham)
- Cybera (R. Windsor)
- Canadian Oil Sands Innovation Alliance (D. Wicklum)
- Institute of Corporate Directors Symposium - Sustainable Development: Embracing Environment, Social and Geopolitical Challenges Responsibly
- Ron Dyck
- Energy Resources Conservation Board (D. McFadyen)
- Explorus Inc. (B. MacArthur, M. Scarth, A. Joseph)
- Robert Fessenden
- Fort McKay First Nation (Dr. J. O'Connor)
- Government of the Northwest Territories (R. Case, E. Kelly)
- Kanai First Nations (Charlie Fox)
- Mikisew Cree First Nation (M. Lepine, B. Maclean)
- University of Calgary, School of Public Policy (Jack Mintz)
- Northwest Territory Métis Nation (T. Heron)
- Parks Canada (S. Macmillan)
- Silvacom (T. Grabowski, B. Morton)
- Smith's Landing First Nation (C. Heron)
- TOTAL E&P Canada Limited (J. Gires, M. Dube)
- University of Alberta (A. Leach)
- University of Alberta, Dean Alberta School of Business (Joseph Doucet)
- WaterSmart (K. Sturgess, M. Nemeth)

Glossary

Ambient: The environment that surrounds an ecosystem.

Arm's Length Agency: An organization that has some degree of autonomy from government, but is not removed from accountability to government. A mandate document sets out roles and responsibilities of the Minister and the Government Board providing clear accountabilities.

Anthropogenic: Human-induced or caused.

Baseline (environmental): An initial set of observations or environmental data used for comparison or as a control against any future trends. It is also important to continuously monitor the state of the natural environment to understand natural variability and change. In addition to historical records to support design of surface water and groundwater systems, much operational management of water systems and flood warning and management needs real-time information on precipitation and surface water levels.

Baseline Monitoring: Describes the state of the environment and its natural variability. It quantifies background levels of physical, chemical and biological parameters at locations that are least developed or ideally "non-impacted" by anthropogenic disturbance so that environmental changes can be measured. Baseline monitoring establishes the benchmark against which sites that are affected by development can be compared.

Compliance Monitoring: The monitoring of variables required for regulatory compliance.

Community-Based Monitoring: A process where concerned citizens, government agencies, industry, academia, community groups and local institutions collaborate to monitor, track and respond to issues of common community concern[46]. It is a collaborative process that incorporate local knowledge, Traditional Knowledge and western science.

Cumulative Effects: Changes in the environment due to the combined effects of past, present and foreseeable human activities.

Cumulative Effects Management: Managing the cumulative effects of development considering all activities in an area and their collective impact on the environment, society and economy when making decisions.

Environmental Monitoring System: A set of functions that collectively work together to allow standardized and systematic measurement, evaluation and reporting of environmental conditions.

Effects Monitoring: describes monitoring activities undertaken to determine the status or trend of specific environmental attributes or indicators that reflect the current state of the environment. Simply, effects monitoring focuses on changes in the environment

[46] The Canadian Community Monitoring Network, coordinated by the Ecological Monitoring and Assessment Network Coordinating Office, the Canadian Nature Federation and Voluntary Sector Initiative 18.08.2004 http://www.ccmn.ca/english/glossary.html#CBM.

resulting from various anthropogenic activities. Effects due to natural changes can also be observed.

European Union Clean Fuel Directive: The European Union legislation adopted in December 2008 enacted to reduce carbon intensity in transportation fuels. The main purpose of a low-carbon fuel standard is to decrease carbon dioxide emissions associated with conventional fuels, when considering the entire life cycle (well to wheels), to reduce the carbon footprint of transportation.

Evaluation: Analysis and interpretation of data and information to determine nature, processes, causes and implications of environmental conditions.

Internal Agency: A new department with ESRD operating separate from the regulatory or policy operations of the government and reporting to an Executive Director. The Executive Director reports to the Minister of Environment and Sustainable Resource Development

Governance Board: The group of individuals brought together to manage and administer the Alberta Environmental Monitoring system. These individuals would have a collective senior experience in agency governance, environmental management and monitoring, and business operations.

Investigative Monitoring: Short-term monitoring of selected variables for specific purposes (e.g., test a scientific hypothesis).

Land Use Framework: A provincial planning tool sanctioned under the *Alberta Land Stewardship Act*. There will be seven Regional Plans developed for Alberta, plus separate plans for the Calgary and Edmonton regions.

Monitoring: A scientifically designed system of long-term, standardized measurements and systematic observations to assist in timely decision making, ensure accountability and provide the basis for evaluation and learning. Includes activities undertaken to determine the status or trend of specific environmental attributes or indicators that reflect the current state of the environment.

Operational Excellence: An organization and management culture that is committed to exceptional performance and embraces continuous improvement.

Reporting: Documenting the results of environmental indicator or condition evaluation and performance of management actions, and presenting these results to appropriate audiences at specified times.

Relevant Data: Data gathered specifically to address monitoring objectives, allow clear communication with the public on the state of the environment and support decision-making.

World Class: A scientifically credible and trusted monitoring and reporting system that meets or exceeds international benchmarks and is optimally suited to address Alberta's needs.

Acronyms and Abbreviations

AANDC	Aboriginal Affairs and Northern Development Canada
ABMI	Alberta Biodiversity Monitoring Institute
AEM system	Alberta Environmental Monitoring system
AEMP	Alberta Environmental Monitoring Panel
AITF	Alberta Innovates Technology Futures
AOSERP	Alberta Oil Sands Environmental Research Program
COSIA	Canadian Oil Sands Innovation Alliance
EPA	US Environmental Protection Agency
ESRD	Environment and Sustainable Resource Development
ESRF	Environmental Studies Research Funds
EU	European Union
GDP	Gross Domestic Product
GHG	Greenhouse gas
GOWN	Groundwater Observation Well Network
GRF	General Revenue Fund
Minister	Minister of Environment and Sustainable Resource Development
NRBS	Northern River Basins Study Board (1991-1996)
NRCan	Natural Resources Canada
NRR	Natural Resource Revenues
NWT	Northwest Territories
OSLI	Oil Sands Leadership Initiative
OSRIN	Oil Sands Research and Information Network
RAMP	Regional Aquatics Monitoring Program
RAP	Regional Advisory Panel
SAB	Science Advisory Board
SAGD	Stream-Assisted Gravity Drainage
TKAP	Traditional Knowledge Advisory Panel(s)
USEPA	US Environmental Protection Agency
USGS	United States Geological Survey
WBEA	Wood Buffalo Environmental Association
Working Group	Alberta Environmental Monitoring Working Group

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Appendix A
Working Group Members' Biographies and Terms of Reference

Members' Biographies

Mr. Ernie Hui is the Chief Executive Officer, Environmental Monitoring, Environment and Sustainable Resource Development, previously the Deputy Minister of Alberta Environment and Water. Since 1989 he has served in a number of different and progressive roles within Alberta Environment and Sustainable Resource Development. Extensively involved in water allocation issues and in managing the development of the *Water Act*.

Mr. Hal Kvisle has more than 35 years of engineering and business experience, and is the former president and CEO of TransCanada Corporation. He is a board member of the Bank of Montreal, Talisman Energy, ARC Resources and Northern Blizzard Resources. He serves as chair of the Nature Conservancy of Canada and served as co-chair on the 2011 Alberta Environmental Monitoring Panel.

Mr. Neil McCrank is an experienced negotiator and lawyer. He was a senior Alberta Government official for over 20 years as Deputy Minister of Justice and Chairman of the Alberta Energy and Utilities Board. Currently counsel with Borden Ladner Gervais LLP.

Dr. Gregory Taylor is a professor of Biological Sciences and Dean of Science at the University of Alberta. His research focus includes how plants tolerate stresses such as metal toxicity and nutrient deficiency. He served on the 2011 Alberta Environmental Monitoring Panel.

Dr. Howard Tennant is the former president and vice-chancellor of the University of Lethbridge, and has served on several public and private sector boards including three terms on the governing board of the National Research Council. He served as co-chair on the 2011 Alberta Environmental Monitoring Panel.

Dr. Ron Wallace (Chair) is a widely-published, Emerald-Award winning aquatic ecologist. Retired in 2005 as CEO of an international manufacturer; his past experience includes World Bank assignments for major development projects in Russia and Venezuela. He served on the 2011 Alberta Environmental Monitoring Panel.

Working Group Terms of Reference

Purpose

The purpose of the Working Group is to provide expert advice, viable options and recommendations to the Minister of Environment and Water which Government of Alberta will consider in deciding the future governance and funding of a new provincial monitoring, evaluation and reporting system. Recommendation and advice will need to attend to the mandate, scope, and roles and responsibilities of the various parties who could be involved in the provincial system.

Background

Alberta's environmental regulatory capacity has been increasingly challenged in national and international forums, due to a lack of a comprehensive, transparent and scientifically rigorous monitoring, evaluation and reporting system. To address this challenge the Minister of Environment established the Alberta Environmental Monitoring Panel in 2011. This panel of independent experts provided its report to the Minister of Environment in June 2011.

The Panel made 20 recommendations, two of which represent major policy shifts for the Government of Alberta and require government's careful consideration before a decision is taken. Specifically, the Panel recommended:

- establishing an arm's length public agency with enough authority and resources to lead and carry out environmental monitoring, evaluation and reporting in Alberta; and
- providing a dedicated, stable revenue stream to fund monitoring, evaluation and reporting.

Focusing specifically on, but not limited to, the two major policy shifts, the Working Group will provide further advice to help the Minister understand the possible implications of these two recommendations and identify options to achieve the intended outcomes.

Context

Alberta has been moving towards a natural resource and environmental management system that understands, plans for and manages cumulative impacts of human activities on the natural environment. Key pieces of this natural resource management system include the Land Use Framework (regional planning), Alberta's policy and regulatory system (including the new single regulator for oil and gas activities), and the environmental data and information that support this system. Any recommendations or advice on governance must therefore address both the design and management of the monitoring system itself, as well as the effective positioning of monitoring, information and evaluation as part of the broader system of natural resource and environmental management.

Based on the Alberta Environmental Monitoring Panel's recommendations and subsequent internal analysis, the Minister of Environment and Water has expressed her support for an independent arm's length public agency governance option, but is not dismissing other options, such as an agency within government.

Deliverables

The Working Group will deliver a written report with recommendations and other relevant advice that outlines and assesses governance options ranging from an arm's length public agency to a structure internal to the Government of Alberta.

For each option identified, the report will:

1. Describe the proposed structure, its intended responsibilities, products and deliverables, and its relationships of authority, consultation, advice or accountability with agencies within Government of Alberta, the Government of Canada, First Nations and Métis, current monitoring partners, and stakeholders, at both the Provincial and regional scale, including how the structure will affect the oil sands regional environmental monitoring partnership between Environment Canada and Alberta Environment and Water.
2. Outline how the option provides for effective management of the monitoring system, including how it:

> Addresses the range of monitoring and variety of roles and functions required for effective natural resource and environmental management (e.g. industry, regulated and effects monitoring)

> Achieves operational excellence, legitimacy and credibility for the provincial monitoring, evaluation and reporting system;

> Ensures accessibility, quality and transparency of data and information;

> Provides scientific oversight and validation through independent science and a peer review process.

3. Indicate how the option ensures that monitoring contributes as part of the broader system of natural resource and environmental management;
4. Indicate options, recommendations and implications of sustainable funding mechanisms and budgetary accountability;
5. Identify how and by whom decisions relating to allocating scarce resources will be made.
6. Identify transitional steps required to implement the option.

The Working Group may make a recommendation as to the preferred option and in doing so must clearly state the reasons for making the recommendation.

It is expected that the Working Group will consult as it deems necessary with other parties, government departments and agencies to meet these terms of reference.

Alberta Environment and Water will provide necessary support for the Working Group.

The Working Group will provide its report and recommendations to the Minister by 30 June 2012.

B

Appendix B
Alberta Environmental Monitoring Panel 2011 Report Recommendations

Recommendation 1: Comprehensive Environmental Monitoring System as a Pillar of Natural Resource Management in Alberta

The Panel recommends comprehensive environmental monitoring, evaluation and reporting as a fourth pillar of Alberta's natural resource management framework, alongside regional land use planning, an enhanced energy regulatory process and cumulative environmental effects management.

Recommendation 2: Expansion and Integration of Environmental Monitoring in Alberta

The Panel recommends that, to achieve a world class standard, Alberta a) expand its environmental monitoring activities to place a greater emphasis on baseline monitoring and environmental effects monitoring; b) integrate and organize environmental monitoring, evaluation and reporting activities; and c) facilitate effective flow of information between those responsible for baseline monitoring, compliance monitoring and effects monitoring activities, including compliance agencies and scientific experts.

Recommendation 3: Traditional Environmental Knowledge

The Panel recommends that mechanisms be established to ensure that Traditional Environmental Knowledge is respected and utilized in environmental monitoring, evaluation and reporting in all regions of Alberta.

Recommendation 4: Improving Federal and Provincial Environmental Coordination and Cooperation

The Panel recommends that Alberta take a lead role in clarifying the roles and responsibilities of Alberta and Canada with respect to environmental monitoring to achieve world class results that reflect scientific and operational excellence.

Recommendation 5: A New Monitoring, Evaluation and Reporting System for Alberta

The Panel recommends that a province-wide monitoring, evaluation and reporting system be organized on a regional basis, aligning with the boundaries described in the Alberta Land Use Framework. The new system would provide regional and province-wide information that is timely and useful to government, regulators, industry, researchers, stakeholders and the public.

Recommendation 6: Values and Principles

The Panel recommends that the following values and principles be adopted to guide the development and operations of the environmental monitoring, evaluation and reporting system:

- **Legitimacy:** The environmental monitoring, evaluation and reporting system must be independent of government, industry and special interests.
- **Credibility:** Science must drive the design, execution, evaluation and reporting of monitoring programs. Activities must be conducted in an open and transparent manner.
- **Relevance:** Information provided by the environmental monitoring, evaluation and reporting system must meet the needs of stakeholders.
- **Operational Excellence:** The environmental monitoring, evaluation and reporting system must demonstrate excellence in all aspects of field monitoring, evaluation and reporting.

Recommendation 7: Scientific Oversight and Rigor

The Panel recommends that science be the primary driver of the design and execution of monitoring, evaluation and reporting activities. All monitoring, evaluation and reporting activities must demonstrate scientific rigor and continually adapt to environmental change, local and regional needs, evolving scientific knowledge and advances in technology.

Recommendation 8: Data Management, Information and Reporting

The Panel recommends that Alberta's environmental monitoring, evaluation and reporting system include a coordinated, publicly accessible data management system for baseline monitoring data, compliance monitoring data and effects monitoring data, with protocols to ensure transparency in data collection, analysis, reporting, and conveyance to government.

Recommendation 9: The Alberta Environmental Monitoring Commission

The Panel recommends that Alberta establish the Alberta Environmental Monitoring Commission as a science-driven, arm's length, and operationally excellent public agency. The Commission would be responsible for baseline monitoring, effects monitoring and state of the environment monitoring in all regions of Alberta.

Recommendation 10: Commission Mandate

The Panel recommends that the Alberta Environmental Monitoring Commission:

a. Be responsible for field monitoring, data evaluation and reporting of environmental conditions, including baseline monitoring and effects monitoring for all regions of Alberta;

b. Be responsible for all aspects of environmental effects monitoring, whether field activities are conducted directly by the Commission or by other entities acting for the Commission. The quality and efficiency of all monitoring programs would be the responsibility of the Commission;

c. Where appropriate, assume direct responsibility and accountability for regional effects monitoring programs currently carried out by industry or by stakeholder organizations; and

d. Have access to all compliance monitoring data as input to its evaluation and reporting activities. The Commission could provide technical and scientific advice and assistance to government and regulators regarding the design and operations of compliance monitoring activities. However, the Commission would not be responsible for compliance enforcement.

Recommendation 11: Coordination with Alberta Government Ministries and Corporations

The Panel recommends that the Minister of Environment create a Monitoring Advisory Committee to coordinate cross-ministry interests.

Recommendation 12: Coordination with Other Teaching and Research Organizations

The Panel recommends that the Alberta Environmental Monitoring Commission coordinate its research-related activities with Alberta Advanced Education and Technology and Alberta's universities and colleges.

Recommendation 13: Governance Board

The Panel recommends that the Minister of Environment appoint a Board to govern the Commission. All Board members should be selected based on merit relevant to the Commission. The Board would be led by a Chair and Vice-Chair appointed by the Minister.

Recommendation 14: Interim Appointments

The Panel recommends that the Minister of Environment select an Interim Chair and Vice-Chair for the Commission, who would then consult with the Minister on the process of naming interim Board members. This is an urgent requirement and should be in place in a matter of months to expedite the transition from the current system.

Recommendation 15: Science Advisory Panel

The Panel recommends that the Commission appoint a Science Advisory Panel composed of internationally-recognized experts in environmental monitoring, evaluation and reporting to provide independent advice on the design, implementation and quality of the Commission's monitoring, evaluation and reporting activities.

Recommendation 16: Aboriginal Participation

The Panel recommends that the Commission establish a mechanism, in consultation with representatives from Treaties 6, 7 and 8 and the Métis Nation of Alberta, to enable aboriginal communities to develop a proposal for their participation in Commission activities, including community-based monitoring programs.

Recommendation 17: Stakeholder Input

The Panel recommends that the Commission establish mechanisms to encourage and facilitate stakeholder input to monitoring programs in each region as well as at the provincial level.

Recommendation 18: Funding the New Environmental Monitoring System

The Panel recommends that a dedicated and sustainable funding model be established to support the work of the Commission. Alberta should use its legislative authority and negotiating power to determine which parties should share the cost of implementing the required monitoring, evaluation and reporting system.

Recommendation 19: Assessment of Existing Environmental Monitoring Activities

The Panel recommends that the interim Board of the Commission complete, as an early priority, an assessment of all existing monitoring programs in Alberta with a view to developing a strategy for the integration of existing monitoring programs into the work of the Commission, as appropriate.

Recommendation 20: Phased Implementation

The Panel recommends that the new monitoring, evaluation and reporting program be implemented first in the Lower Athabasca region, and then implemented in phases throughout the rest of Alberta.

C

Appendix C
Long-Term Monitoring Programs in Alberta[47]

Long-term ambient monitoring has occurred in Alberta for over 100 years, beginning with water flow measurements and weather monitoring. Initially, Alberta's long-term networks focused on basic inventories and descriptions of environmental resources. Today, these networks (Figure C-1) play a number of vital roles in the overall management of the environment. While they are primarily in place to provide consistent data sets over time, long-term data, sites and stations can be correlated with more targeted research and monitoring programs to provide a cumulative understanding of environmental effects and issues.

Air Monitoring

Air quality is measured through both continuous and passive air monitoring. The data are collected at 110 permanent stations across Alberta, which are monitored 24 hours a day seven days a week by Alberta Environment and Water (AEW) (now renamed as Alberta Environment and Sustainable Resource Development (AESRD). The air monitoring program was developed in 1978 and was recently modified in 2003. The data collected measures the concentrations of:

- carbon monoxide;
- fine particulate matter;
- nitrogen dioxide;
- ozone; and
- sulphur dioxide.

Currently, 50 air stations are operated through nine airshed partnerships, another 55 stations are operated by regulated parties, 4 stations by AEW, and 1 station by Environment Canada. AEW ensures that data collected at network stations meet stringent quality control and quality assurance standards.

When required, AEW conducts mobile monitoring using a Mobile Air Monitoring Laboratory, partnering with Edmonton and Calgary to maintain the mobile emergency air monitoring vehicle.

[47] Alberta Environment. 2011. Monitoring, Evaluation and Reporting within the Province of Alberta: An Information Package for the Provincial Environmental Monitoring Panel, Section 4.

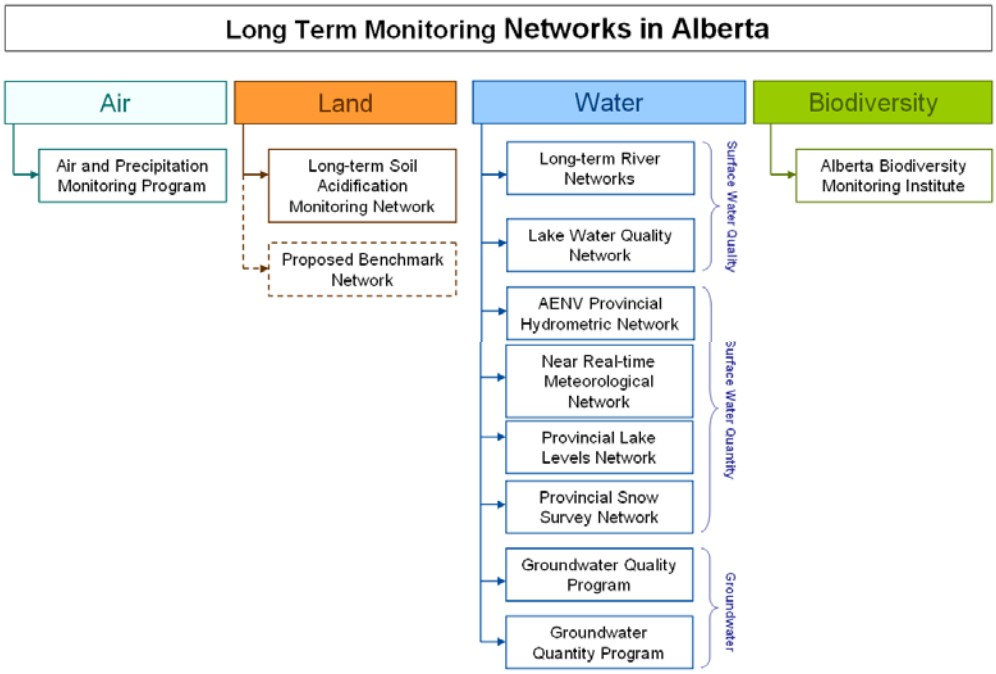

Figure C-1: Long Term Monitoring Networks in Alberta for Air, Land, Water and Biodiversity

Land Monitoring

The long term Soil Acidification Monitoring Network monitors parameters related to soil acidification, such as pH and soluble and exchangeable ions. The network is comprised of eight sites on private and public land across the province. Soil acidification parameters are used to proactively measure long-term trends in acid deposition effects and to determine if management of acidic emissions is required. AEW is also responsible for monitoring land reclamation and remediation, pesticide management, and pipeline reclamation across Alberta. This work is carried out in partnership with ministries, such as Sustainable Resource Development, Alberta Agriculture and Rural Development.

Water Monitoring

Surface Water Quality

The Long Term River Network and the Lake Water Quality Network Surface provide information on Alberta's surface water quality.

Alberta's Long Term River Network evolved from a smaller network founded by the federal government in the 1960s. The Government of Alberta took over operations in 1987. Measurements are taken on major river systems at 28 locations, providing information on baseline conditions for surface water quality in Alberta. A core suite of water quality parameters are sampled monthly and include major ions, nutrients, phytoplankton, and bacteria. Trace metals, cyanide, and Total Organic Compounds samples are collected on a quarterly basis and pesticide sampling is done three to five

times a year. With this information an index value is calculated annually with a range of poor to excellent depending on the given number. The network sustains a provincial-scale database to provide consistent information for describing water quality conditions representative of Alberta Rivers, showing trends in concentrations and contaminant loads, calibrating and validating models, detecting and understanding emerging issues, and evaluating management strategies and their effectiveness.

The Lake Water Quality Network is a coordinated, partnered approach to assessing conditions in Alberta's pressured recreational lakes and reservoirs. AEW, Department of Tourism, and Parks and Recreation staff normally collect data. However, AEW also contracts the Alberta Lake Management Society (ALMS) to coordinate and conduct a volunteer-based lake monitoring program – Lakewatch. ALMS operates the Lake Trophic Status program. All water quality data supports assessment of the Aquatic Ecosystem Health component of Water for Life and is used by the Departments of Health and Wellness and Alberta Health Services to determine human health risks from recreational contact with lake water.

Surface Water Quantity

Water quantity is measured through two distinct network types: hydrometric monitoring, consisting of stream flow and water level measurements, and meteorological monitoring, which measures precipitation and snow. Programs under the umbrella of these two networks include the:

- Provincial Hydrometric Network;
- Near Real Time Meteorological Network;
- Provincial Lake Level Network; and
- Provincial Snow Survey Network.

Hydrometric monitoring is performed under the Canada-Alberta Hydrometric Agreement, with delivery provided by the Water Survey of Canada (Environment Canada). Hydrometric stations measure water flow (velocity) or water level, depending on the type of water body (e.g., river, lake). Stations are either annual - monitored 12 months a year, or seasonal - monitored eight months a year. The recorded water level data are used to generate a time series of stream flow data for streams across Alberta.

The Provincial Hydrometric Network has 43 stations from which Environment Canada collects data for its annual publication. The data support information on water management, water supply, river ice break up, and flood forecasting. High water levels and other water related emergency events are reported through this network. In some cases, where flows have an increased human consumption, the network attempts to use flow naturalization techniques.

The Near Real Time Meteorological Network has approximately 100 data stations that record precipitation levels and air temperature. Roughly 15 percent of these stations are climate stations that provide more in depth information such as snow pillars. Stations are managed and operated through partnerships with AARD, SRD, EC, Parks Canada, and

private ski hills. The data supports water supply information, flood forecasting, and aids in the operation of provincial dams and reservoirs. Calibration of flood forecasting models and water supply forecasting procedures is also based on the historical data provided by this network. Fire weather, crop insurance and drought forecasting all use these data.

The Provincial Lake Level Network shows the lake levels of 27 Alberta lakes, and these lakes are generally not reservoirs or lakes subject to diversion or withdrawals because this indicator is intended to reflect the environment's response to natural fluctuation in climate. Water levels are compared to historical data and then are ranked in five categories ranging from much above normal to much below normal. The data are used to support the operations of water management structures, licensing, water supply, drought evaluation, water quality indicators, recreational purposes, regional planning, and climate change initiatives. Volunteers supplement the three times per year (spring, summer, fall) manual visits by AEW staff with weekly gauge readings.

The Provincial Snow Survey Network has 117 snow survey sites, 46 in the mountains and 71 in the plains. Since snowmelt causing flooding in the plains, the surveys are conducted monthly, five days from the end of the month, from November to June. The parameters collected include snow depth and weight, from which snow water equivalent is derived. The data provides information that supports water supply and flood forecasting models as well as the operations of infrastructure (e.g., dams and reservoirs).

Groundwater

The wells in the Groundwater Observation Well Network (GOWN) are fitted with specialized electronic equipment that continually records the groundwater levels. Each well is visited a minimum of two times a year, in the spring and fall. GOWN consists of two programs, a Groundwater Quality Program and a Groundwater Levels Program.

The Groundwater Quality Program was established in 2006 to monitor the quantity and quality of the groundwater. Wells are on a three year cycle and are meant to monitor anthropogenic impacts and natural groundwater quality changes. Parameters monitored include major ions, trace elements such as metals, sulphides, volatile priority pollutants, extractable priority pollutants, Polycyclic Aromatic Hydrocarbons, volatile organic compounds, stable isotopes, oxygen, sulphate, and dissolved and free gasses. Pesticides and bacteria parameters are also measured. Free and dissolved gasses are measured in relation to issues such as coal bed methane development and carbon capture and storage development.

The Groundwater Levels Program has 200 wells that are visited two times a year. These wells track the long term natural variations in groundwater levels. The information collected provides a gauge on groundwater use impacts.

Biodiversity Monitoring

The Alberta Biodiversity Monitoring Institute (ABMI) monitors the state of land, water, and wildlife using indicators of environmental health. There are 1,656 permanent monitoring sites across Alberta, and each site is surveyed in July on a five year cycle to maintain consistency and reduce variation due to seasonal impacts. The ABMI's indicators encompass more than 2,200 species, habitats, and human disturbance. Terrestrial and wetland survey sites are established on a 20 km systematic grid, with a random distance and directional offset of up to 5.5 km. Because terrestrial sites are not stratified, environmental conditions are sampled in proposition to their availability on the landscape. For example, sites can exist in cities, public or private lands, industrial instillations, protected areas, or lakes. The data collected includes mammals in winter surveys, the physical characteristics of sites, migratory birds, dead woody material, and trees and snags during spring. Raw information is then converted into knowledge and applied to resource management.

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