

FINAL TERMS OF REFERENCE
ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR THE

PROPOSED BOW CITY POWER PROJECT

Approximately 25 km Southwest of Brooks
Bow City, Alberta

Issued By: Alberta Environment

Date: December 7, 2005

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1.0 INTRODUCTION

1.1 The EIA Report

The purpose of this Terms of Reference is to identify for the public and the proponent, the information requirements of government regulatory review agencies needed to assess the environmental impacts associated with development of the proposed Project.

The proponent will prepare and submit an Environmental Impact Assessment (EIA) report to explain the environmental effects of the proposed Project and other existing and planned activities in the area in combination with the proposed Project. The EIA report and application will be prepared in accordance with the requirements prescribed under the *Environmental Protection and Enhancement Act* (EPEA). The EIA report will form part of the proponent's application to the Alberta Energy and Utilities Board (EUB).

1.2 Public Consultation

The proponent's public consultation program will facilitate communication with members of the public and industry who may be affected, directly or indirectly, by the proposed Project and will provide them with an opportunity to participate in the Environmental Assessment process. The EIA report will document the results of the public consultation program (see Section 10.0 for details) and will provide environmental information to address the issues raised.

The consultation requirement for the EIA report does not give any party additional rights or status with the EUB or during the EPEA and *Water Act* approval processes. Status and rights in those approval processes are determined by the applicable governing legislation.

1.3 Proponent's Submission

The proponent is responsible for the preparation of the EIA report and related applications. The submission will be based upon the final Terms of Reference and issues raised during the public consultation process. The EIA report will include a glossary of terms and a list of abbreviations to assist the reader in understanding the material presented. The EIA report will include tables that cross-reference the subsections of the report to the EIA Terms of Reference and to any applications submitted pursuant to the EPEA and *Water Act*.

2.0 PROJECT OVERVIEW

The proponent shall:

- a) provide a corporate profile, an overview of the proposed Project, the key environmental, resource management and economic issues that are important for a public interest decision and a summary of the results of the EIA report;
- b) identify those responsible for the development, management and operation of the proposed Project; and
- c) provide a brief history of the proponent's exploration and operations in the Bow City area.

3.0 REGULATORY PLANNING AND FRAMEWORK

The proponent shall:

- a) identify all regulatory approvals that have been granted that relate to the proposed Project;
- b) identify the government legislation, regulatory approvals and agreements applicable to the review of the proposed Project. List the major components of the proposed Project that will be applied for and constructed within the duration of proposed approvals under the EPEA and *Water Act*;
- c) identify other regulatory authorizations that will be required for the proposed Project and describe the schedule and mechanisms the proponent will utilize to comply with these regulatory processes;

- d) identify and discuss any municipal, provincial or federal multi-stakeholder planning initiatives or policies that apply to the proposed Project (such as Coal Development Policy, Water for Life Policy, Federal Policy for Wetland Conservation, Transmission Development Policy, Land Use Zoning, Wildlife Management Areas, Climate Change Central, Clean Air Strategic Alliance and Integrated Resource Management);
- e) provide a summary of the regional, provincial or national objectives, standards or guidelines that have been used by the proponent to assist in the evaluation of the significance of environmental effects; and
- f) provide documentation of consultation with local municipalities and discuss how the proposed Project would be consistent with the intent of municipal plans, bylaws and initiatives.

4.0 PROJECT DESCRIPTION AND MANAGEMENT PLANS

The proponent shall:

- a) provide the scope of the proposed Project description in sufficient detail to allow quantitative assessment of the environmental consequences. If the scope of information varies among components or phases of the proposed Project, the proponent shall provide a rationale demonstrating that the information is sufficient for EIA purposes;
- b) describe the proposed Project components, infrastructure and activities. Discuss the alternatives considered, the alternative selection process, the potential effects that activities and infrastructure may have on the environment and the natural resources to be used for the proposed Project. Outline the management plans to minimize the discharge of pollutants, manage wastes, reclaim disturbed lands and water bodies, optimize resource use and monitor effects;
- c) describe all of the activities and components of the proposed Project that are proposed for approval. Provide outlines of the relevant management plans for these activities; and
- d) provide technical information required in this Section that may also be required for regulatory approvals (See Appendix). This information may be provided in other parts of the proponent's submission provided that the location of the information is appropriately referenced in the EIA report.

4.1 Project Need and Alternatives Considered

The proponent shall provide an overview of Alberta's deregulated electrical supply system and discuss the need for additional electrical energy capacity and where and when the capacity is needed. The proponent will also discuss the proposed Project's electricity supply capacity, including where the energy is to be produced and alternative energy sources.

The proponent shall address the following:

- a) an analysis of the key energy alternatives that were considered for carrying out the proposed Project, including the potential alternative of not proceeding with development. Include a comparison of their environmental performance potential and/or other relevant variables;
- b) the rationale for the decisions made about power plant combustion, cooling and emission control technology alternatives and the status of any ongoing analyses, including a discussion of the options not chosen and the rationale for their exclusion. Discuss how a balance between environmental, resource recovery or conservation and economic goals has been achieved through planning and preliminary design, highlighting any areas where planning focussed on one goal in exclusion of others;
- c) discuss the current state of carbon dioxide (CO₂) sequestration technology and its feasibility for coal fired generation such as the Bow City Project;
- d) alternative mining methods and their environmental implications;
- e) alternative power plant and coal preparation plant site locations considered and discuss the rationale for choosing the proposed sites instead of alternative sites;

- f) options and technologies considered for wastewater treatment, wastewater management and re-use strategies, and reasons, including water quality and environmental considerations, for selecting the preferred options in the context of best available technologies;
- g) contingency plans if major project components or methods prove to be unfeasible or do not perform as expected;
- h) implication of a delay in proceeding with the proposed Project, or any phase of the proposed Project; and
- i) potential cooperative development opportunities for the proposed Project (e.g., shared infrastructure and the implications of the proposed Project for ongoing regional management and research initiatives).

4.2 Project Components and Development Timing

4.2.1 Project Components

4.2.1.1 Power Plant

The proponent shall describe the nature, design capacities and location of the significant components of the power plant, including but not limited to:

- a) coal handling;
- b) ash handling and disposal;
- c) boiler design;
- d) turbine design;
- e) generator design;
- f) pollution control equipment; and
- g) cooling systems.

Discuss how the proponent has used community input for development of the power plant facility.

4.2.1.2 Coal Preparation Plant

The proponent is currently evaluating the feasibility of incorporating a coal preparation plant into the proposed Project. Should a coal preparation plant become part of the project design, describe the nature, design capacities and location of the significant components of the facility, including but not limited to:

- a) run of mine raw coal stockpile;
- b) dry screening process;
- c) coal preparation plant process;
- d) coarse waste rejects;
- e) fine waste rejects;
- f) clean coal stockpile; and
- g) pollution control equipment.

Discuss how the proponent has used community input for development of the coal preparation plant facility.

4.2.1.3 Mine Plan

The proponent shall provide a description and drawings of the proposed surface coal mine plan and geotechnical considerations, including but not limited to:

- a) mine area required to support the life of the proposed Project;
- b) geological reserves that are economically mineable;
- c) mining rate required to support the power plant;
- d) the proposed mine development/timing sequence;

- e) plans to maximize coal recovery and address coal deposits at the sites selected for the power plant and cooling pond;
- f) location of coal stockpiles;
- g) the type and size of mining equipment to be used;
- h) mine traffic plan with coal haul road locations through the various mine development stages; and
- i) the plan to relocate local range roads, highways, EID canals/ditches/drains, oil/gas pipelines and other infrastructure that must be relocated to complete the mining operation, including methods and timing.

Discuss how the proponent has used community input for development of the mine plan.

4.2.2 Development Timing

The proponent shall provide a description and site development plan to illustrate the proposed stages or phases of the activities and likely development timing, explaining:

- a) the timing for the proposed Project to come on-stream;
- b) the timing and duration of key pre-construction, construction, operational, decommissioning and reclamation activities; and
- c) the key factors controlling the schedule and uncertainties.

4.3 Technology Selection and Process Description

The proponent shall describe the coal combustion and electricity generation process. Describe how alternative technologies were evaluated and summarize the results including:

- a) best available technology economically achievable (BATEA) for coal mining, coal transport, coal processing, ash disposal, combustion, pre- and post-combustion treatment to remove contaminants, NO_x, (oxides of nitrogen), SO₂ (sulphur dioxide), particulates, CO₂, and mercury reduction and potential capture and storage, and cooling, and address water requirements for plant cooling in the context of water as a scarce commodity in the Project Area;
- b) the environmental and energy thermal efficiency of the proponent's selected generating technology compared to leading alternatives such as those outlined in the *1995 Fuel Cycle Emissions Analysis of Existing and Future Electric Generation Options in Alberta, Canada - Integrated Gasification Combined Cycle (IGCC), Pressurized Fluidized Bed Combustion (PFBC) and Coal/Natural Gas-Fired Hybrids* and;
 - i) provide a table comparing NO_x, SO₂, CO₂, particulate emissions and energy efficiency; and
 - ii) compare the effect of the technology on waste streams, water requirements and disposal requirements.
- c) compare identified technology alternatives and their environmental effects and impacts, with the rationale for selecting the proposed technology

The proponent shall provide material balances, energy balances, flow diagrams, coal analysis (including trace metals) and descriptions of the appropriate processes, including thermal efficiency and net energy efficiency relative to electricity produced, parasitic losses within the plant, electricity delivered to the grid and water conservation.

4.4 Product Handling

The proponent shall:

- a) identify the location and amount of all onsite storage associated with production, including storage of coal, catalysts, chemicals, products, by-products, intermediates and wastes; and
- b) explain containment and environmental protection measures with reference to relevant government guidelines.

4.5 Utilities and Transportation

The proponent shall describe the proposed project infrastructure requirements including, but not limited to:

- a) vehicular access to the proposed Project and identify any upgrading needs;
- b) any expected changes in traffic volume, by Average Annual Daily Traffic (AADT) and type on area municipalities, highways and roads in the surrounding area and the proposed mitigation with consideration of cumulative effects with other existing and planned operations, during the construction, operation and reclamation of the proposed Project;
- c) locate on maps of appropriate scales the infrastructure and transportation (access) requirements for the proposed Project;
- d) how personnel will travel to the plant site and how materials will be delivered during construction, operation and reclamation phases of the proposed Project;
- e) requirements to realign highways and municipal roads in the Project Area. Include any current proposed routing and watercourse crossing requirements for these realignments;
- f) the result of consultation with the local transportation authorities and other stakeholders, including the Highway 539 Relocation Study and other transportation studies that are underway or planned. If regional infrastructure is required, identify the locations, routes and any upgrading needs and who would be responsible for installation and approval of these facilities; and
- g) the shared use of facilities and utilities by the proposed Project.

4.6 Transmission Capabilities

The proponent shall:

- a) discuss the capacity of the existing transmission lines in the Brooks area to handle the additional power when the proposed Project comes on-stream;
- b) provide the potential location of proposed transmission lines and discuss the impacts on affected landowners for alternative transmission connection schemes;
- c) provide results of discussion with the Alberta Electrical System Operator regarding power additions to the provincial electrical grid; and
- d) identify the regulatory processes and decisions that will determine what changes to the transmission system are required to accommodate the proposed Project [e.g., the Transmission Regulation, *Electric Utilities Act* (AR 174/2004), future applications under the *Hydro and Electric Energy Act*].

4.7 Water Supply, Water Management and Wastewater Management

(See Appendix for Power Plant and Coal Preparation Plant Approval Requirements)

4.7.1 Water Supply and Water Management

The proponent shall describe the process water requirements and discuss design considerations to ensure efficient use of water including:

- a) a water balance for the proposed Project and identify the proposed source(s) for water supply;
- b) water requirements relative to the mining activity, power generation, cooling system and water intake mechanism. Discuss how these requirements will be met including, but not limited to, the water source, withdrawal location, diversion rates, periods of diversion and the potential for off-stream storage;
- c) water requirements during construction, normal operation, reclamation, emergency situations and miscellaneous uses such as dust control, road construction and irrigation;
- d) describe any third party involvement/agreements regarding water supply and the use of water conveyance infrastructure, and identify any related constraints/restrictions and management strategies;
- e) how water diversion activities would be adjusted to meet any instream flow objectives that may be set for the identified sources of supply;
- f) any variability in the amount of water required on an annual and seasonal basis and any changes anticipated throughout the life of the proposed Project;

- g) onsite potable water and sewage systems;
- h) the design parameters and criteria for any water management works and storage facilities;
- i) any proposed water releases or intakes, locally and cumulatively with other activities in the Study Areas;
- j) a water management plan addressing site runoff, groundwater protection and mine dewatering;
- k) water management programs specifically addressing anticipated water use minimization, water recycling and water conservation efforts; and
- l) a contingency plan for water conservation in the event of low water flow conditions in the Bow River.

4.7.2 Wastewater Management

The proponent shall provide plans for wastewater management that address process wastewater, site runoff, sewage, groundwater protection, deep well disposal and wastewater treatment and disposal including, but not limited to:

- a) source, quantity, location and quality of runoff and each wastewater stream from the proposed facilities and reclamation water releases. Provide loading estimates for significant contaminants in the proposed releases.
- b) quantify any thermal effects of the proposed wastewater releases;
- c) National Pollutants Release Inventory (NPRI), Priority Substances List 1 (PSL1), Priority Substances List 2 (PSL2) or Accelerated Reduction and Elimination of Toxics (ARET) substances relevant to the proposed Project;
- d) design criteria of facilities that will handle, treat and store wastewater streams;
- e) type and quantity of chemicals used in water and wastewater treatment;
- f) options and technologies considered for wastewater treatment, wastewater management strategies and reasons, including water quality and environmental considerations for selecting the preferred options in the context of best management practices and best available technologies;
- g) proposed management plans and objectives of the plans; and
- h) describe potable water and sewage treatment systems that will be installed as components of the Project for both the construction and operation stages of the mine and plant sites. Discuss other treatment systems considered and the reason for selecting the preferred options.

4.8 Air Emissions and Regional Air Issues Management

(See Appendix for Power Plant and Coal Preparation Plant Approval Requirements)

The proponent shall identify the type, volume, rate and source of air emissions for the proposed Project including point and area sources, fugitive, construction and coal handling equipment emissions and;

- a) discuss management plans for air emissions;
- b) discuss the following from a management perspective:
 - i) NPRI, PSL1, PSL2, or ARET substances;
 - ii) potential odorous or visual (opacity and colour) emissions from the mine, coal preparation plant and power plant sites;
 - iii) potential water vapor emissions from the power plant with respect to drift icing, fogging and visibility;
 - iv) proposed area sources, fugitive, construction and coal handling equipment emissions control technologies in the context of BATEA;
 - v) proposed power generation emission control technologies in the context of BATEA and applicability of government guidelines; and
 - vi) fugitive emissions associated with coal mining, hauling (truck emissions) and the processing and storage of coal.
- c) model air emissions and relate the modelling results to the Alberta Acid Deposition Management Framework or any region-specific environmental management objectives;
- d) model secondary particulate from acidifying emissions (NO_x and SO_2) and discuss the fate and effects in conjunction with primary particulate;

- e) provide a detailed summary of all emission rate calculations, including inputs based on the project coal analyses and any assumptions used;
- f) discuss the fate and effects of coal dust from the Project and plans to mitigate and monitor the potential impacts;
- g) discuss any air management activities conducted by the proponent or in partnership regionally with other industrial operators, to determine the contribution of industrial emissions to the formation of carbonaceous semi-volatile and acidifying emissions, secondary particulate matter and ground-level ozone (O₃) in the air shed and any efforts to minimize industrial contributions to the formation of secondary particulate matter and O₃ in the air shed; and
- h) present ozone observations in the region and provide applicable observational or modelling results from studies of emission sources similar to the proposed Project and discuss how the proponent will manage ozone regionally.

4.8.1 Greenhouse Gas Emissions

Provide the following:

- a) the expected annual and total greenhouse gas (GHG) emissions over the construction, operation and decommissioning phases of the Project;
- b) the Project's marginal contribution to total provincial and national GHG emissions on an annual basis;
- c) the intensity of GHG emissions per unit of product produced and discuss how it compared with similar projects and technology performance;
- d) how the project design and GHG management plans have taken into account the need for continuous improvement with respect to GHG emissions and their consideration of the national *Climate Change Plan for Canada* and *Alberta's Climate Change Action Plan*; and
- e) the proponent's overall GHG management plans, any plans for the use of offsets (nationally or internationally) and the expected results of implementing the plans.

4.9 Hydrocarbon, Chemical and Waste Management

(See Appendix for Power Plant and Coal Preparation Plant Approval Requirements)

The proponent shall:

- a) identify anticipated hazardous and non-hazardous wastes and recyclables and dangerous goods generated or used by the proposed Project;
- b) identify how each waste stream will be managed; and
- c) demonstrate that the selected management options are consistent with the current regulatory requirements and industry practice.

4.10 Environmental Management System and Contingency Plans

4.10.1 Environmental Management System

The proponent shall summarize key elements of its environmental, health and safety management system and discuss how it will be integrated into the proposed Project and address the following:

- a) corporate policies and procedures, operator competency training, release and air emission reporting procedures and emergency response plans;
- b) plans to mitigate and minimize the production or release into the environment of substances that may have an adverse effect; and
- c) the emergency response plan's capability to deal with unpredicted negative impacts.

4.10.2 Contingency and Adaptation Plans

The proponent shall:

- a) provide a conceptual contingency plan that considers environmental effects associated with operational upset conditions such as serious malfunctions or accidents; and

- b) describe the flexibility built into the plant design and layout to accommodate future modifications required by any change in emission standards, limits and guidelines.

4.11 Reclamation and Plant Decommissioning

(See Appendix for Power Plant and Coal Preparation Plant Approval Requirements)

The proponent shall provide a conceptual and progressive reclamation closure plan for the proposed Project that outlines existing land uses, reclamation concepts applicable to the environmental setting, regulatory requirements, stakeholder preferences, proposed end land use objectives and other factors necessary for this plan to be implemented. Include:

- a) pre-development information with respect to existing agricultural land capability, irrigation suitability, existing land uses, landowner consultation, soils, aggregate resources, native vegetation communities and biodiversity, wildlife and published information related to coal mine reclamation experience/outcomes of other prairie coal mine operations;
- b) a discussion of the distribution and characteristics of the planned conceptual post-reclamation biophysical units including soils, topography/landforms, vegetation, drainage/surface water, land uses, irrigation suitability and agricultural capability and discuss any significant differences from pre-disturbance conditions or adjacent land;
- c) a discussion of the aquatic components of the post-reclamation landscape, including end pit lakes. Address issues related to the design of a self-sustaining and productive aquatic ecosystem;
- d) a discussion of the reclamation objectives, how the reclamation plan will meet the objectives and how reclamation success will be measured and assessed. Include in the reclamation plan procedures and mitigative measures to be implemented during construction, operation and reclamation to maintain soil quality/quantity and restore appropriate irrigation suitability, topography, drainage/surface water, vegetation and land uses and achieve equivalent land capability and agricultural productivity. More specifically, at an appropriate scale for environmental assessment, include:
 - i) soil/reclamation material and overburden handling procedures (planning, timing and logistics, salvage, transport, storage, replacement and final preparation for revegetation). Discuss how problem soils/overburden will be handled. Provide an estimation of soil volumes available for salvage with a reconciliation of soil replacement requirements for reclamation;
 - ii) discuss how replaced topsoil and subsoil quality/quantity will be checked for adequacy before revegetation;
 - iii) discuss measures that will be taken to ensure that at least an equivalent amount of land area suitable for irrigation before disturbance is restored after reclamation (e.g., re-establish soil-landscape characteristics suitable for irrigation). Discuss how the EID irrigation system and surface drainage will be re-established;
 - iv) reclamation methodology for any collection, settlement and containment sumps/ponds;
 - v) discuss how the revegetation plan and native grassland vegetation communities will be re-established and discuss the challenges, current limitations and uncertainties in the re-establishment of self-sustaining native vegetation communities;
 - vi) mine development phasing, integration of mining, conceptual reclamation sequencing for each phase of development, timeframe for completion of reclamation phases and provide a general discussion of the proponent's land policy on the sale or lease of reclaimed land back to original owners or the public; and
 - vii) identify any long-term reclamation management and maintenance requirements associated with the reclamation plan and who will be responsible for them.
- e) a general discussion of the post-reclamation site conditions including final topography and integration with surrounding topography, soil physical and chemical characteristics, surface drainage and final vegetation. Provide a map and description of reclaimed soil/landscape units and quantitatively compare pre-development capabilities with the projected post-reclamation capabilities and highlight both negative and positive changes including a discussion of any trade-offs;

- f) a discussion of what special reclamation measures will be employed to address any unique aspects of vegetation restoration, including the feasibility of native seed and sod salvage and what information resources will be employed to facilitate that reclamation (IL96-6, Alberta's Native Revegetation Guidelines). Include a discussion of published and ongoing research on native grasslands reclamation and describe any research studies to be conducted to fill information gaps;
- g) a discussion of plans for power plant and coal preparation plant decommissioning and decontamination;
- h) a discussion of how the reclamation plan incorporates diversity, size and extent of wetlands into the final reclamation design. Discuss the quantity and quality of the post reclamation groundwater regime in the EIA Study Areas with an assessment of the nature and significance of the changes from the pre-development conditions;
- i) a discussion of the process to address changes in stakeholder preferences for reclamation plans;
- j) an analysis of residual impacts and their significance with respect to soil quality/quantity, topography, drainage/surface water, groundwater, vegetation, land uses, irrigation suitability and equivalent land capability relative to pre-disturbance conditions. Include an assessment of long-term land uses that will be appropriate above ash, such as, irrigation farming (reference experience at other mines in Alberta); and
- k) the identification of any operational (during plant/mine operation) or post-reclamation/mine closure biophysical monitoring that would assist in the confirmation of residual adverse environmental effects or reclamation success.

4.12 Participation in Regional Cooperative Efforts

The proponent shall:

- a) document their involvement in regional cooperative efforts to address environmental, health and socio-economic issues associated with industrial development during the life of the proposed Project;
- b) identify potential cooperative ventures that the proponent is participating in, has initiated, could initiate or could develop with other operators and other resource users to minimize the environmental impact of the proposed Project or the regional impact of developments; and
- c) discuss how they will work to develop such cooperative opportunities and identify a timeframe for their implementation.

5.0 ENVIRONMENTAL ASSESSMENT

Define assessment scenarios including:

- i) a Baseline Case, which includes existing environmental conditions, existing and approved projects or activities;
- ii) an Application Case, which includes the Baseline Case plus the Project; and
- iii) a Cumulative Effects Assessment (CEA), which includes past studies, existing and anticipated future environmental conditions, existing projects or activities, plus other or planned projects or activities.

Note: For the purposes of defining assessment scenarios, "approved" means approved by any federal, provincial or municipal regulatory authority. "Planned" is considered any project or activity that has been publicly disclosed prior to the issuance of the Terms of Reference or up to six months prior to the submission of the Project Application and EIA report, whichever is sooner.

5.1 Basic Information Requirements for the Environmental Assessment

The EIA report will include the following basic environmental information for the three assessment scenarios:

- a) quantitative and qualitative information about the environment and ecological processes in the EIA Study Area(s);

- b) a description of any deficiencies or limitations in the existing environmental database, its impact on the analysis and any appropriate follow-up;
- c) discussion of the reliability of data, including predictive modelling, used in the EIA,
- d) information about the past, existing and planned human activities in the EIA Study Area(s) and the nature, size, location and duration of their potential interactions with the environment, (e.g., land disturbance, discharges of pollutants, changes to access status and any significant effect the proposed Project may have on the present and future capacity of renewable resources);
- e) information about ecological processes and natural forces that may produce changes in environmental conditions (e.g., wildfires, flood or drought conditions, predator-prey population cycles);
- f) the use of appropriate predictive tools and methods that enable quantitative estimates of future conditions with the highest possible degree of certainty;
- g) definition of the methodology used to classify and evaluate the significance of effects. The classification will include qualitative and quantitative descriptions of the effects having regard for direction, magnitude, geographic extent, duration, reversibility and frequency. The determination of significance considers management objectives or baseline conditions as well as the views of the proponent and stakeholders with the results described qualitatively;
- h) management plans to prevent, minimize or mitigate adverse effects and to monitor and respond to expected or unanticipated conditions including any follow-up plans to verify the accuracy of predictions or determine the effectiveness of mitigation plans; and
- i) a discussion of residual effects and their environmental consequences having regard for regional management initiatives that are underway or in development.

5.2 Study Areas

The proponent shall:

- a) define and provide the rationale for the spatial and temporal boundaries for the Study Area(s) used for the assessment. The spatial boundaries shall include all areas where measurable changes in the environment may be caused by the proposed Project regardless of any political boundaries. At and beyond the boundary of the EIA spatial Study Area(s) the anticipated environmental conditions should be similar with and without the proposed Project. The temporal boundary for the EIA Study Area(s) should extend from the pre-development baseline conditions through the construction, operational and reclamation/decommissioning phases of the proposed Project. If historical information or future information is inadequate to apply the full scope of temporal boundaries the EIA report shall identify the boundaries used and provide a rationale for the boundaries selected; and
- b) provide maps of suitable scale that include legal land descriptions, topographical and other natural features that illustrate the proposed Project Area and EIA Study Area(s).

5.3 Cumulative Effects Assessment (CEA)

The proponent shall identify and assess the cumulative environmental effects of the proposed Project (including the Coal Preparation Plant if proposed) and include the following:

- a) consideration of the environmental effects from other existing and proposed projects, activities and land uses or reasonably-foreseeable projects, activities and land uses in the region;
- b) demonstration that any information or data used from previous and other development projects is appropriate for use in this EIA report. Supplement the information where required and consider all relevant components of the environment; and
- c) explanation of the approach and methods used to identify and assess cumulative effects including cooperative opportunities and initiatives undertaken to further the collective understanding of cumulative effects. Provide a record of all assumptions, confidence in data and analysis to support conclusions. Describe deficiencies or limitations in the existing database on environmental components and propose measures to deal with resultant uncertainties.

5.4 Climate, Air Quality and Noise Baseline Conditions and Impact Assessment

Discuss climatic and air quality conditions considering existing and approved emission sources (baseline case) alone and in combination with the Project's proposed emissions (Application Case). Review current and approved emission sources and discuss changes as a result of anticipated future development scenarios within the EIA Study Areas. Consider emission point sources as well as fugitive emissions. Identify components of the Project that will affect air quality from local and regional perspectives, and:

- a) discuss appropriate air quality parameters such as SO₂, H₂S, total hydrocarbons (THC), NO_x, VOCs, individual hydrocarbons of concern in the THC and VOC mixtures, ground-level ozone (O₃), visibility, representative heavy metals, and particulates (road dust, PM₁₀ and PM_{2.5});
- b) discuss the formation of secondary pollutants such as ground-level O₃, secondary particulate matter, and acid deposition;
- c) estimate ground-level concentrations of appropriate air quality parameters. Discuss any expected changes to particulate deposition or acidic deposition patterns. For any case of acid deposition modelling, provide deposition data from maximum levels to areas with 0.17 keq H⁺/ha/y Potential Acid Input (PAI) including analysis of PAI deposition levels consistent with the CEMA acid deposition management framework. Justify the selection of the models used and identify any model shortcomings or constraints on findings. Complete modelling in accordance with Alberta Environment's *Air Quality Modelling Guidelines*; March 2003;
- d) identify the potential for reduced air quality (including odours and visibility) resulting from the Project and discuss any implications of the expected air quality for environmental protection and public health;
- e) discuss interactive effects that may occur as a result of co-exposure of a receptor to all emissions and discuss limitations in the present understanding of this subject;
- f) describe air quality impacts resulting from the Project, and their implications for other environmental resources, including habitat diversity and quantity, vegetation resources, water quality and soil conservation;
- g) describe how air quality impacts resulting from the Project will be mitigated;
- h) an assessment of the potential for transboundary transport of pollutants into other jurisdictions including federal lands, such as First Nations Lands and Department of National Defence, Saskatchewan and the United States.
- i) comment on the differences, if any, between the proposed project design and the BATEA (e.g. low NO_x burners versus selective catalytic reduction);
- j) identify ambient air quality monitoring that will be conducted during construction and operation of the Project;
- k) assess the cumulative effects on the air quality of the Study Areas and include any related emission increases from adjacent operations and publicly-disclosed projects in the area;
- l) identify any regional air monitoring underway in the area and describe the proponent's participation in any regional forums; and
- m) identify components of the Project that have the potential for creating increased noise levels and discuss the implications and measures to mitigate. Present the results of a noise assessment (as specified by the EUB ID 99-8, Noise Control Directive). Include:
 - i) potentially-affected people and wildlife,
 - ii) an estimate of the potential for increased noise resulting from the development,
 - iii) the implications of any increased noise levels, and
 - iv) proposed mitigation measures.

5.4.1 Climate Change

Discuss the following:

- a) in accordance with the guideline document *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners*, review and discuss climate change and the local and/or regional, inter-provincial/territorial changes to environmental conditions resulting from climate conditions, including trends and projections where available;
- b) identify stages or elements of the Project that are sensitive to changes or variability in climate parameters. Discuss what impacts the change to climate parameters may have on elements of the Project that are sensitive to climate parameters; and
- c) comment on the adaptability of the Project in the event the region's climate changes. Discuss any follow-up programs and adaptive management considerations.

5.5 Terrain, Soils and Land Use

The proponent shall describe the bedrock and surficial geology, soils, terrain and land use in the Study Area(s). Where appropriate use maps, cross-sections and figures to illustrate these features. Explain the significance of any changes resulting from the proposed Project.

5.5.1 Terrain and Soils Baseline Conditions

The proponent shall:

- a) identify the existing terrain and soil resources of the Study Area(s). Map and describe at a scale sufficient to provide information for long term life of mine reclamation planning. The soil landscape units of the proposed Project Area shall be presented on an air photo mosaic base;
- b) characterize soil properties of the representative soils types in the proposed Project Area with respect to baseline soil properties required to assess agriculture capability, potential environmental impacts (including soil properties needed to assess potential air emission deposition effects) and to plan construction/reclamation;
- c) provide a topographic map of the Study Areas and describe topographic patterns (e.g., elevation, slope gradients, relief);
- d) characterize the distribution and properties (e.g., salinity/sodicity) of bedrock and overburden as needed to plan construction and reclamation and maintain equivalent land capability;
- e) describe and map the pre-development agricultural capability using a capability assessment methodology that is appropriate for the purposes of impact assessment. For the purposes of the detailed conservation and reclamation plan Alberta Environment requires the use of *Agricultural Capability Classification for Reclamation: Working Document* (Leskiw, 1993) to assess pre-disturbance and post-reclamation capability. Discuss the use of this methodology for the purposes of the detailed conservation and reclamation plan for the proposed Project;
- f) discuss the existing information related to Level II and Level III land classification for the Project Area pursuant to *Procedures Manual for the Classification of Land for Irrigation in Alberta* (Alberta Agriculture, Food and Rural Development, 2000). Discuss how this information and how additional pre-mining Level II information will be collected and used to assess the re-establishment of irrigation suitability. Include a discussion of soil hydraulic properties (infiltration rates, saturated hydraulic conductivities and water holding capacities);
- g) describe the methodologies to compare pre- and post-disturbance agricultural capability and rangeland capability in order to verify restoration of equivalent capability. Address the uncertainties and limitations of the methodologies;
- h) describe the methodology by which pre-disturbance and post-reclamation agricultural productivity will be characterized and compared to verify the return of equivalent capability; and
- i) describe the methodology to be used to verify that at least an equivalent amount of land area suitable for irrigation before disturbance is re-established after reclamation.

5.5.2 Terrain and Soils Impact Assessment

The proponent shall:

- a) discuss and assess potential project impacts including contamination and their significance to soil quality/quantity, topography, land use, irrigation suitability and agricultural capability from project construction and reclamation procedures and plant and mine operations. Include an assessment of suitability of soil types and overburden (including potential problems) for construction and reclamation with respect to maintaining soil quality/quantity, irrigation suitability, agricultural capability and re-establishment of native vegetation during salvage, storage and replacement activities. Address contingencies for wet and frozen soil and vegetation conditions;
- b) assess potential impacts of air emission deposition on the soil and vegetation in the Study Area(s), including acidification and relevant metals loading and bioaccumulation through the food chain with implications for human health. Include predicted annual and cumulative loading rates on the soil and compare to baseline soil conditions. Discuss measures to mitigate and remediate these potential impacts. Discuss potential residual impacts and their significance;
- c) discuss how disturbed areas and exposed soils will be stabilized and protected from wind and water erosion throughout project construction, operation, abandonment and reclamation;
- d) discuss the equipment used for construction and reclamation in the context of using equipment suited to the size of the job and those resulting in the least possible impacts to soils during salvage and replacement;
- e) discuss the proposed ash management plans (including mitigative measures) and any effects (potential and residual) on the final reconstructed soils including physical, chemical and biological properties, soil internal drainage, irrigation suitability and the effects on groundwater. Include monitoring for potential effects from the ash in the overall soil and groundwater monitoring programs; and
- f) discuss the soils monitoring programs that will be undertaken to assess the impacts of the proposed Project on soils in the Study Areas and the effectiveness of mitigation and reclamation measures. Discuss how the soils monitoring programs will be used to adaptively manage the mitigation measures and monitoring programs.

5.5.3 Land Use Baseline Conditions and Impact Assessment

The proponent shall:

- a) identify existing land uses and landowners in the local Study Area. Determine and assess the impacts of the development on these uses and landowners and identify possible mitigation strategies. Describe proposed end land use objectives in the reclamation plan. Discuss the potential for improved use of the land after development in the reclamation plan;
- b) identify any land use plans (including Integrated Resource Management Plans, municipal land use plans, Alberta's Native Prairie Conservation Action Plan...) in the Study Area(s) and comment on how the Project integrates with the current land use patterns and policies for the area. Describe whether the proposed Project is consistent with these plans or whether the proposed Project will affect these plans;
- c) discuss plans for land acquisition and the requirements to develop a land acquisition policy;
- d) identify unique sites or special features in the Study Area(s). Discuss any potential impacts of the proposed Project on these features. Identify and discuss any Special Places candidate sites, Environmentally Sensitive Areas, reserves or other protected areas, conservation agreement lands and habitat enhancement projects in the Study Area(s) and the potential impacts of the proposed Project on these areas;
- e) identify and discuss the implications for regional recreational activities, public access and other land uses during construction and operation and after the development activities in the reclamation plan;
- f) discuss plans to address community issues and the concerns of existing landowners due to the various impacts of the proposed project activities;

- g) discuss the petroleum and natural gas resources and mineral rights in the area, the issues and potential conflicts between the proponent and these resource uses/rights, how the Project schedule may be impacted by these potential conflicts, the efforts and plans to address and mitigate the potential economic impacts of mining upon these uses/rights, as well as the impacts of other future developments on the proponent's rights to access its minerals; and
- h) discuss the ammonite and aggregate resources including sand, gravel and marl in the area and show the impact of the mine plan on these resources. Discuss a plan to mitigate the disruption of access and preserve the resources for future use.

5.6 Vegetation Baseline Conditions and Impact Assessment

Discuss and map vegetation communities in the EIA Study Area(s) using, as appropriate, the *Alberta Vegetation Inventory Standards Manual* (AVI) Version 2.1, including the following:

- a) conduct an inventory, map and describe the existing terrestrial and aquatic vegetation (including agricultural, native grasslands, coulee shrublands, ephemeral and other wetlands). Include any rare vascular and non-vascular species, rare plant communities and wetlands in the Study Area(s);
- b) conduct and discuss the results of a rare plant survey in the local Study Area based on a literature review, on information stored in the Alberta Natural Heritage Information Centre and on the results of a recent field survey that employs recognized survey protocols and is designed specifically for rare plant species and communities in the region;
- c) discuss existing range/pasture use and capability in the Study Area(s). Conduct and discuss a pre-development rangeland health assessment using Range/Pasture Health Assessment (Alberta Rangeland Health Task Group, 2000) to assess pre-disturbance and post reclamation rangeland capability and the return of equivalent capability;
- d) discuss the use of a pre-mining field assessment of vegetation health in the Study Area(s) to assess and monitor the potential impacts of air emissions in the Study Area(s);
- e) describe the location, size of wetlands, wetland type, condition, flora and fauna in the Study Area(s);
- f) describe wetland function and ecosystem components that contribute to the integrity of the wetland. Describe how wetland function and ecosystem components that contribute to the integrity of the wetland will be affected by the Project;
- g) describe the ecological function the wetland is contributing, including but not limited to, quantity of surface water and groundwater, quality of surface water and groundwater, terrestrial and aquatic habitat;
- h) discuss mitigation measures to address the no-net-loss of wetland function;
- i) discuss and assess potential impacts of the project construction, operation and reclamation on vegetation (abundance, diversity, health, rare species and rare plant communities) in the local Study Area and discuss the implications of these impacts on other resources (wildlife habitat quantity and diversity, water quality, erosion potential and soil conservation);
- j) discuss measures to be implemented to prevent, mitigate, monitor and reclaim potential impacts and cumulative effects of the proposed Project on vegetation including native prairie species, rare plants and plant communities in the Study Area(s). Provide a discussion of various methods and alternatives for re-establishing native grasslands including, but not limited to, native seed salvage and native sod salvage;
- k) identify any setbacks proposed around environmentally sensitive areas such as surface waterbodies, riparian areas and wetlands;
- l) discuss weeds and non-native invasive species in the proposed Project Area and describe how these species will be assessed and controlled prior to and during project construction, operation and reclamation;
- m) describe any plans for using chemicals to manage weed growth in intake and outflow canals, including strategies for minimizing adverse environmental impacts associated with the use of such chemicals;

- n) discuss the vegetation monitoring programs that will be undertaken to assess the impacts of the proposed Project on vegetation and the effectiveness of mitigation and reclamation measures; and
- o) discuss how the vegetation monitoring programs will be used to adaptively manage the mitigation measures and monitoring programs.

5.7 Wildlife Baseline Conditions and Impact Assessment

The proponent shall discuss existing wildlife resources (amphibians, reptiles, birds and terrestrial and aquatic mammals), their use and potential use of habitats in the Study Area(s). Document the anticipated changes to wildlife in the Study Area(s) including the following:

- a) document and describe the important, abundant, game, indicator and sensitive (species of concern) terrestrial and aquatic wildlife species in the Study Area(s) using recognized survey protocols to provide current field data. Emphasis will be on “endangered” and “threatened” species as defined by COSEWIC (Committee on the Status of Endangered Wildlife in Canada), the federal *Canadian Species at Risk Act*, and the *Alberta Wildlife Act* (species “at risk” or species that “may be at risk”). Include important concentrations of wildlife during the breeding season and migration period. Using literature reviews, interviews and discussions with Alberta Sustainable Resource Development personnel, other experts and other relevant sources of information (including Alberta Natural Heritage Information Centre) list current and historic field data for all species of concern described in *The General Status of Alberta Wild Species 2000* (Alberta Environment/Alberta Sustainable Resource Development, 2000, Pub No. 1/023) and *Canadian Species at Risk*, May 2001 (COSEWIC, 2001) in the Study Area(s). Include age/sex composition (primarily ungulates), seasonal distribution, relative abundance, seasonal movements, movement corridors, specific habitat requirements and general life history parameters. Wildlife species to be considered including, but not limited to:
 - i) Species of Concern:
 - (i) “At Risk”: Burrowing Owl, Ferruginous Hawk, Peregrine Falcon and Northern Leopard Frog;
 - (ii) “May be at Risk”: Long-billed Curlew, Short-eared Owl, Long-tailed Weasel, Prairie (Western) Rattlesnake, Canadian Toad, Great Plains Toad and Plains Spadefoot; and
 - (iii) Sensitive: American Bittern, American White Pelican, Baird’s Sparrow, Black-crowned Night Heron, Black-necked Stilt, Black Tern, Brewer’s Sparrow, Grasshopper Sparrow, Great Blue Heron, Lark Bunting, Loggerhead Shrike, Pied-billed Grebe, Prairie Falcon, Sharp-tailed Grouse, Sprague’s Pipit, Swainson’s Hawk, Upland Sandpiper, Western Grebe, American Badger, Pronghorn Antelope, Bull snake, Common Garter Snake, Plains Garter Snake and Western Terrestrial Garter Snake.
 - ii) Game animals: Mule Deer, White-tailed Deer, Pronghorn Antelope, Moose, Pheasant, Gray Partridge, Sharp-tailed Grouse, ducks and geese; and
 - iii) Others (consider in general “habitat suitability” and landscape-level habitat evaluations): Coyote, Red Fox, Common Porcupine, Common Muskrat, American Beaver, White-tailed Jackrabbit, Mountain Cottontail, other weasels, Striped Skunk, voles, mice, shrews, ground squirrels and bats.
- b) discuss and assess the potential impacts of the proposed Project on all selected wildlife populations, critical habitat use, habitat availability and quality as well as food supplies during the site surveying, preparation, construction, operation and reclamation phases of the proposed Project, both locally and cumulatively with other activities in the Study Areas. Consider, describe and discuss wildlife habitat loss, abandonment, reduced effectiveness, fragmentation and alteration as it relates to possible reduced reproductive potential and recruitment into local and regional wildlife populations over the life of the proposed Project. Discuss the potential cumulative effects of all phases of the proposed Project on wildlife in combination with other proposed, existing and approved developments in the Study Area(s);
- c) discuss any existing wildlife studies that may be occurring in the Study Area(s) and how the proponent plans to integrate its operational and mitigation activities with existing research;

- d) discuss the impacts of the proposed Project on habitat enhancement projects in the Study Area(s) funded by the North American Waterfowl Management Plan, and proposed mitigation measures;
- e) discuss the potential for avian botulism to affect surface water in the local and regional study areas, as a result of the Project;
- f) discuss the potential for the selected cooling pond to provide open water during the winter, the potential of the pond to attract and overwinter waterfowl, the resulting effects, and plans to mitigate these potential effects;
- g) proposed strategies to minimize and/or mitigate impacts on wildlife habitat and wildlife populations as a result of the various phases of planning, preparation, construction, operation and reclamation of the proposed Project especially in terms of wildlife displacement and habitat loss. Consider hunting (rifle, archery, primitive weapons) as a tool or means to manage game species on the Project lands during all phases of the proposed Project where feasible. In particular, the reclamation plan will address strategies for mitigation of unique and desirable wildlife habitat features;
- h) discuss mitigation strategies, potential habitat enhancement measures and schedule for wildlife and wildlife habitat areas impacted by the proposed Project. The plan will address provincial and federal wildlife and wildlife habitat legislation and regulations;
- i) discuss potential and/or possibilities to return the area to pre-disturbed wildlife habitat and population conditions;
- j) discuss the need for access control (locations and timing) and other management strategies to protect wildlife during construction, operation and reclamation;
- k) identify and discuss proposed monitoring programs, including bio-monitoring for project emissions in indicator species, that will be implemented during the construction, operation, reclamation and post-reclamation follow-up phases of the proposed Project to assess wildlife impacts and evaluate the effectiveness of mitigative strategies and habitat enhancement measures; and
- l) discuss how the wildlife monitoring programs will be used to adaptively manage the mitigation measures and monitoring programs.

5.8 Surface Water, Groundwater, Water Quality and Aquatic Resources

(See Appendix for Power Plant and Coal Preparation Plant Approval Requirements)

5.8.1 Surface Water Baseline Conditions and Impact Assessment

The proponent shall discuss baseline surface hydrology and hydrologic parameters including precipitation, evaporation and surface water runoff in the Study Area(s). Differentiate between managed waterbodies (e.g., irrigation works) and natural waterbodies and identify interconnections. Identify proposed project activities that may affect surface water during all stages including site preparation, construction, operations, decommissioning and reclamation in the Study Area(s). In addition:

- a) identify all watercourses and waterbodies within the Local and Regional Study Areas. With the use of maps of appropriate scale, show boundaries of Local and Regional Study Areas, describe drainage area boundaries and their locations relative to the Project Area;
- b) identify any planned monitoring to assess performance of water management programs, confirm the impacts that may be predicted by the environmental assessment and assess the effectiveness of mitigation measures;
- c) describe the effects of these changes on hydrology (e.g., timing, volume, peak and minimum flow rates) including the significance of effects for downstream waterbodies;
- d) describe the potential impacts and cumulative effects of any alteration in flows on local and regional hydrology and identify all temporary and permanent alterations, diversions or disturbances, their extent, duration and proposed mitigation measures. Include an assessment of impacts of proposed and current water withdrawals from the Bow River;
- e) describe the impacts of the proposed Project on downstream watercourses and nearby waterbodies, including fish habitat considering seasonal fluctuations in both the water demand and the watercourse flows;

- f) describe how land disturbance associated with the proposed project activities and activities considered in the CEA such as how mining will affect the Bow River watershed;
- g) describe and assess the impacts of the proposed Project on wetlands in conjunction with other project-induced variations in hydrology (surface and groundwater flows), habitat quality and wildlife populations. Discuss the impact of any loss of wetlands as well as how this will affect land use, fragmentation and biodiversity;
- h) discuss how potential impacts to wetlands will be mitigated. Discuss plans to return disturbed wetland areas to a self-sustaining habitat considering previous capability, biodiversity and land uses;
- i) describe all existing users and uses of surface water that could be affected by the Project. Describe plans and agreements for working with other water users to ensure minimal or no impacts on existing water uses;
- j) discuss the impact of water withdrawal during the low flow periods on the Master Apportionment Agreement; and
- k) discuss a hydrometric monitoring program to monitor the hydrologic changes in the watershed.

5.8.2 Groundwater Baseline Conditions

The proponent shall provide an overview of the existing geologic and hydrogeologic setting in the Study Area(s) and:

- a) discuss regional and site-specific geology using structure contour maps, geologic cross sections, isopach maps to illustrate depth, thickness and spatial extent of lithology, stratigraphic units and structural features;
- b) discuss regional and site-specific hydrogeology describing:
 - i) spatial distribution of aquifers, aquifer properties and hydraulic connections among aquifers;
 - ii) hydraulic head, hydraulic gradient horizontal and vertical and groundwater flow directions and flow velocity;
 - iii) potential discharge zones, recharge sources, areas of groundwater-surface water interaction and areas of surficial-bedrock groundwater interaction; and
 - iv) recharge potential for the aquifers in the Study Area(s).
- c) describe and discuss groundwater quality in a regional and site-specific context;
- d) describe and include any field and modelling methods used to determine the effects of the proposed Project on existing and future groundwater supplies;
- e) describe field methods used to gather survey information on existing groundwater users in the Study Areas;
- f) identify groundwater uses including consumptive use;
- g) identify and describe water well development within a regional and site-specific development context; and
- h) discuss mine dewatering predictions and use or disposal options. Include:
 - i) a prediction of water volumes from mine dewatering for different areas of the mine (reference experience at other mines in Alberta);
 - ii) an assessment of disposal options for mine dewatering water, including an assessment of potential impacts to surface water quality (reference experience at other mines in Alberta); and
 - iii) an analysis of options for the beneficial use of mine dewatering water, especially from areas where large volumes are predicted.

5.8.3 Groundwater Impact Assessment

The proponent shall:

- a) identify the components and activities of the proposed Project which have the potential to affect groundwater resources during all stages of project development, operation and reclamation;
- b) describe the nature and significance of the predicted effects and impacts of the proposed Project which have the potential to affect groundwater resources in the Study Area(s) during all stages of project development, operation and reclamation;

- c) discuss the inter-relationship between groundwater and surface water in areas potentially affected by the proposed Project and the potential for impacts on surface water flow and quality as a result of effects on groundwater. Utilizing experience from other operations in Alberta describe the potential contaminant sources including, but not limited to, fly ash and bottom ash and contaminant migration in groundwater and its impact on surface water;
- d) discuss groundwater discharges to watercourses in terms of volume, rates, timing and duration. Describe seasonal variations;
- e) discuss changes to groundwater that might have implications for terrestrial or riparian vegetation or for wildlife and aquatic resources in the Study Area(s). Evaluate effects of activities such as the cooling pond and ash management facility on groundwater flow to the Bow River;
- f) assess the potential for changes to groundwater quality resulting from the proposed Project including cumulative effects on groundwater in the Study Areas. Describe programs to manage and protect groundwater resources and mitigative measures to minimize impacts to groundwater during project development, operation and reclamation including:
 - i) identify residual impacts of the proposed Project on groundwater and describe significance;
 - ii) describe a proposed monitoring program to address the potential impacts of the proposed Project; and
 - iii) describe response strategies, management plans and mitigative measures that may be considered in the event that adverse effects on groundwater, groundwater users and potential surface waters are detected.
- g) assess the effects on groundwater resources in gravel aquifers both within and adjacent to the mine boundary;
- h) discuss mine dewatering predictions and use or disposal options; and
- i) demonstrate that any data used for this proposed Project from previous work conducted in the Study Area(s) remains valid and document any new hydrogeologic investigations including methodology and results undertaken as part of the EIA report.

5.8.4 Water Quality Baseline Conditions

Describe pre-development water quality and sediment quality conditions of surface waterbodies that will be influenced by the proposed Project or have the potential of being influenced by some or all aspects of the proposed Project. Consider waterbodies in the mine permit area and power plant site, waterbodies which receive effluent discharges and selected waterbodies which may be affected by atmospheric contaminant loading such as Kitsim Reservoir, Lake Newell and the Bow River.

For these waterbodies, summarize baseline data for water, sediments and non-fish aquatic biota considering:

- a) relevant water quality parameters including, but not limited to, temperature, pH, dissolved oxygen, major ions, metals (including selenium and mercury), trace organic compounds, suspended solids and nutrients and compare water quality data to the *Surface Water Quality Guidelines for Use in Alberta* (AENV 1999), *Canadian Water Quality Guidelines* (CCME 1999) and USEPA Guidelines;
- b) relevant sediment quality parameters and evaluate sediment data with respect to the *Canadian Interim Sediment Quality Guidelines*;
- c) relevant biological information that could be used to represent baseline community composition, species diversity or contaminants levels;
- d) determine if and describe how, the existing water quality and sediment quality database is representative of waterbodies that may be affected by all aspects of the proposed Project considering:
 - i) the relevance;
 - ii) the representativeness; and
 - iii) the temporal variability captured by the data base; and

- e) provide a list of the trace organic compounds that will be analyzed. Discuss whether the list will include current-use pesticides, especially herbicides for local agriculture or for controlling weed growth in irrigation canals and blue-green algal toxins (microcystins and anatoxin).

5.8.5 Water Quality Impact Assessment

The proponent shall identify project activities that may influence water quality and describe how the proposed Project will impact surface water quality and:

- a) predict water quality changes that may be expected:
 - i) consider relevant water quality parameters, their seasonal variation and relationship to hydrology and climate and other controlling factors;
 - ii) compare the water quality changes to appropriate water quality guidelines and baseline conditions;
 - iii) assess differences in export of materials from pre-development land use practices compared to practices proposed on reclaimed land and evaluate implications on receiving waterbodies (consider compost materials that may be used).
- b) predict sediment quality in the Study Area(s) that may be expected due to the proposed Project:
 - i) include appropriate sediment quality parameters, and parent and alkylated PAH's; and
 - ii) include comparisons to the *Canadian Interim Sediment Quality Guidelines* and their departure from baseline conditions.
- c) discuss the environmental significance of changes predicted in water and sediments;
- d) describe plans for monitoring water and sediment quality during the operational and post-operational phases of the Project;
- e) discuss the potential fate and effects of atmospheric deposition, including acid deposition and mercury from both the proposed Project and overall regional developments on surface waterbodies in the region;
- f) discuss any proposed mitigation plans and identify any anticipated residual effects on water and sediment quality in the Study Areas. Describe the residual effects for all stages of the proposed Project. In addition to watercourses on- and off-site, include a discussion of the Bow River and tributaries which drain the Study Area(s);
- g) determine the impact of any water diversion for the proposed Project on water quality in the Bow River;
- h) discuss the existing groundwater quality on a regional and site specific context. Describe the methods that will be used to determine the background groundwater quality; and
- i) discuss the potential contaminant sources and contaminant migration pathways in groundwater. Describe the methods that will be used to predict the effect on groundwater quality. Include an assessment of the effects on groundwater quality from the burial of ash (reference experience at other mines in Alberta).

5.8.6 Aquatic Resources Baseline Conditions and Impact Assessment

The proponent shall identify and discuss the existing aquatic resources, including benthic and planktonic invertebrates, fish resource and fish habitat in the creeks, the Bow River or any other waterbodies that might be impacted by the proposed Project. Inventory where data gaps exist as well as:

- a) identify fish species composition, distribution, relative abundance, movements and general life parameters in those waterbodies. Identify key indicator species and provide the rationale and selection criteria used. Identify critical or sensitive areas such as spawning, rearing and over-wintering habitats. Describe and document the critical life stages and requirements for key fish species. Discuss the use of the fish resources by existing or potential domestic, commercial and sport fisheries;
- b) complete an assessment of baseline tissue residue contaminant concentrations (e.g., mercury) in fish that reside in the waterbodies (including Lake Newell) within the zone of impact from the proposed plant (including air and water discharges). Include a list of residues to be determined in the

assessment of baseline tissue residues (concentrations should be compared to the *Canadian Guidelines for Chemicals Contaminants in Fish and Fish Products*). Identify the mechanism(s) and potential existing sources of any tissue contaminant concentrations (if present). Provide projections on future trends and cumulative contamination impacts with key indicator fish species;

- c) identify any project and related infrastructure (e.g., roads, utilities), construction, operation and reclamation activities that potentially affect aquatic resources including benthic and planktonic invertebrates, fish resource, fish habitat, angling activity, recreational use and riparian areas. Describe how stream alterations, changes to substrate conditions, stream flow conditions, water quality (including oxygen levels) and quantity, and thermal effects may affect fish and fish habitat in the Study Area(s);
- d) discuss the nature of the potential effects, their duration and whether they are site-specific, local or regional in spatial extent;
- e) conduct a CEA of the proposed Project in combination with other existing and proposed developments in the area on the fish and fish habitat resources of the Study Area(s);
- f) outline any mitigative measures and habitat enhancement techniques that could be implemented to prevent or minimize adverse effects;
- g) identify residual impacts on fish and fish habitat and discuss their significance in the context of local and regional fisheries. Identify plans proposed to offset any loss in the productivity of fish habitats. Indicate how environmental protection plans will address applicable provincial and federal policies for fish habitat including the “no-net-loss” principle;
- h) identify any monitoring programs that will be initiated by the proponent or conducted in cooperation with other entities to identify and manage the effects of the proposed Project on fisheries, fisheries habitat quality, angling activity and patterns in order to confirm the effectiveness of mitigative strategies employed to ensure protection of the fisheries resources in the Study Area(s). The proponent should indicate which species, size and classes will be used for monitoring contaminants in fish tissue and provide rationale for their selection. The proponent should identify any measures intended to maintain the productive capacity of fish habitat so as to compensate for any activities that cannot be mitigated;
- i) discuss how the proposed Project and all operations will affect the potential for transfer of fish species between the Bow River or any other waterbodies; and
- j) discuss the fish entrainment prevention measures that will be implemented at all water intakes.

5.9 Biodiversity and Fragmentation

The proponent shall:

- a) discuss how the impacts defined in the EIA report could affect local and regional biodiversity and habitat fragmentation both project specific and cumulatively. Use quantitative data where possible to describe the potential effects on biodiversity and habitat;
- b) determine the suite of biotic and abiotic biodiversity indicators for terrestrial and aquatic ecosystems that characterize naturally functioning ecosystems in the Study Area(s) and represent broader taxonomic assemblages using the definition for biodiversity provided in the *Canadian Biodiversity Strategy* (1995);
- c) discuss the selection process and rationale used to select biotic and abiotic biodiversity indicators;
- d) discuss the regional presence and abundance of species in each ecosite phase or ecological type within selected taxonomic groups;
- e) provide species lists and summaries of observed and estimated species richness and evenness;
- f) rank each ecological unit for biodiversity potential by combining measures of species richness, overlap in species lists, importance of individual species or association, uniqueness and other appropriate measures. Describe the techniques used in the ranking process;
- g) discuss the contribution of the proposed Project to any anticipated changes in regional biodiversity including measures to minimize such change;

- h) discuss the proposed Project's incremental contribution to habitat fragmentation on biodiversity with regard to regional levels of habitat fragmentation. Describe the techniques used in the fragmentation analysis. Identify and evaluate the extent of potential effects from fragmentation (e.g., potential introduction of non-native plant species on native species composition and any changes to plant communities) resulting from project activities;
- i) discuss pre- and post-topography, soil and parent material conditions and their contribution to biodiversity;
- j) discuss aquatic and terrestrial ecosystem diversity;
- k) discuss biodiversity on the proposed reclamation ecosites;
- l) discuss how the proponent's plans for monitoring, mitigation, reclamation and follow-up will meet the expectations of *Sustaining Alberta's Biodiversity An Overview of Government of Alberta Initiatives Supporting the Canadian Biodiversity Strategy* (Alberta Environmental Protection, 1998); and
- m) provide a review of techniques and procedures to be implemented to facilitate, enhance and measure biodiversity on reclaimed sites in the Project Area to ensure and verify the return of equivalent capability.

6.0 ENVIRONMENTAL EFFECTS MONITORING

(See Appendix for Power Plant and Coal Preparation Plant Approval Requirements)

The proponent shall discuss environmental effects monitoring (EEM) activities that the proponent will undertake to manage effects and confirm the performance of mitigative measures specifically addressing:

- a) monitoring activities and initiatives that the proponent is proposing to conduct independently of other stakeholder activities in the region;
- b) monitoring activities that the proponent is proposing to conduct collaboratively with other stakeholders. Include in this discussion the role that the proponent anticipates taking in each of the programs;
- c) changes or additions to the programs arising from the project activities and how the proponent will initiate and work with stakeholders to implement these changes;
- d) mechanisms for sharing results, reviewing findings and adjusting programs should monitoring identify unanticipated consequences of the proponent operations or mitigation plans including:
 - i) corporate adaptive management strategies;
 - ii) steps that the proponent will take to involve regulators and public stakeholders; and
 - iii) steps to identify unanticipated conditions to regional management forums if regional environmental conditions may be affected.

7.0 PUBLIC HEALTH AND SAFETY

Describe those aspects of the Project that may have implications for public health. Determine whether there may be implications for public health arising from the Project. Specifically:

- a) identify and discuss the data and methods the proponent's used to assess impacts of the Project on human health and safety;
- b) assess the potential health implications of the compounds that will be released to the environment from the proposed operation in relation to exposure limits established to prevent acute and chronic adverse effects on human health;
- c) identify the human health impact of the potential contamination of country foods and natural food sources taking into consideration all project activities;
- d) provide the information on samples of selected species of vegetation known to be consumed by humans;
- e) discuss the potential to increase human exposure to contaminants from changes to water quality, air quality and soil quality taking into consideration all project activities;

- f) describe the potential for contamination of fish relative to fish consumption guidelines including the potential for bioaccumulation;
- g) during consultation on the project, document any health concerns identified by Aboriginal stakeholders due to the impacts of existing industrial development and of the Project specifically on their traditional lifestyle. Determine the impact of the Project on the health of Aboriginal stakeholders and identify possible mitigation strategies;
- h) assess the cumulative health effects that are likely to result from the Project in combination with other existing, approved and planned projects;
- i) identify, as appropriate, the anticipated follow-up work, including regional cooperative studies. Identify how such work will be implemented and coordinated with ongoing air, soil and water quality initiatives;
- j) identify and discuss the potential health and safety impacts due to higher regional traffic volumes and the increased risk of accidental leaks and spills;
- k) document the health and safety concerns raised by stakeholders during consultation on the Project;
- l) provide a summary of the proponent's emergency response plan and discuss mitigation plans to ensure workforce and public safety during pre-construction, construction, operation and reclamation of the Project. Include a risk assessment, and prevention and safety measures for fire and wildfire occurrences, explosions, water saturated plume from the cooling tower/pond, icy roads in winter months, accidental release or spill of chemicals to the environment and failures of structures retaining water or fluid wastes;
- m) describe how local residents will be contacted during an emergency and the type of information that will be communicated to them;
- n) describe the existing agreements with area municipalities or industry groups such as safety cooperatives, emergency response associations and municipal emergency response agencies; and
- o) provide a literature review on the current state of knowledge and understanding regarding the correlation between exposure to electric and magnetic fields and human health outcomes.

8.0 HISTORICAL RESOURCES

The proponent shall:

- a) provide a summary of the results of the previous historical resource studies that have been conducted in the Study Area(s) including archaeological resources, palaeontological resources and historic period sites and any other historical resources as defined within the *Historical Resources Act*;
- b) provide a general overview of the results of any Historical Resources Impact Assessment and/or mitigation studies that are carried out with respect to the proposed Project;
- c) provide an outline of the historical resources management program and schedule of field investigations that may be required to further assess and mitigate the potential effects of the proposed Project on historical resources. Document any discussions with area residents and First Nations with respect to the management program;
- d) provide a summary of the proponent's consultation with Aboriginal groups to determine the extent of traditional use of the local Study Areas from both an historic and ongoing use perspective; and
- e) document stakeholder concerns with respect to the development of the proposed Project based on the historical significance of the Study Area(s) and its current use by traditional users.

9.0 SOCIO-ECONOMIC FACTORS

The proponent shall provide information on the economic and social effects, including cumulative effects, of the proposed Project including the following:

- a) a brief description of the baseline economic conditions and trends related to the structure of the local economy, labour force, population and population growth;
- b) information for construction and operation phases regarding the effects of the proposed Project on the region and on Alberta including:
 - i) local employment and training;

- ii) local procurement;
 - iii) steps the proponent will undertake to support greater participation by local residents and businesses in meeting project requirements;
 - iv) demands upon local services and infrastructure including municipal water and sewer, health services, transportation, social services, law enforcement and emergency response services; and
 - v) regional and provincial economic benefits including engineering and construction contracts, equipment and materials, construction labour, taxes and royalties.
- c) a discussion of the housing impact in the affected communities and the extent the supply of serviced land can accommodate both the construction and operation phases. If a construction camp is needed during the construction phase, identify the location, the number of workers it is intended to house and what services will be provided at the camp;
 - d) an assessment of the impact on the affected communities related to traffic and road access (if changes will be made to the road network). Comment on the suitability of the road network to accommodate construction and operation related truck traffic;
 - e) policies and programs regarding the procurement of Alberta goods and services and provide an estimate of Alberta, other Canadian and non-Canadian industrial benefits from project acquisitions;
 - f) a breakdown of the timing of the Project and the labour force requirements for the site preparation, construction periods and operations. The breakdown should include the total number of jobs, the sources of labour for the onsite workforce along with a description of when peak activity periods will occur;
 - g) the workforce requirements for construction and operation. Provide a breakdown of the type of employment and number of employees by type that will comprise the workforces during construction and operation;
 - h) an assessment of potential visual impacts of the proposed Project and discuss mitigation measures aimed at reducing any visual impacts arising from the Project;
 - i) provide information respecting the socio-economic impacts of the Project on the communities of the region, including effects on hunting, fishing and trapping;
 - j) discuss strategies and plans to mitigate socio-economic concerns raised by stakeholders in the region; and
 - k) describe any issues raised by residents in the affected communities concerning the Project's impact on quality of life within the defined Study Area.

10.0 PUBLIC CONSULTATION REQUIREMENTS

The proponent shall:

- a) document the public and First Nations consultation process implemented for the proposed Project including the involvement of local residents and other key stakeholders within the Study Area(s). Summarize the existing public and First Nations consultation processes undertaken by the proponent;
- b) discuss the methods by which information was provided to the public and First Nations, the type of information provided and the nature of responses received;
- c) describe the consultative process and show how public and First Nations input was obtained and addressed. Indicate where and when public and First Nations meetings were held and, to the extent possible, list attendees and provide a summary of concerns and ideas that were brought to the attention of the proponent;
- d) discuss the concerns expressed by the public and First Nations and the actions taken to address the concerns;
- e) discuss how resolution of the concerns and issues were incorporated into the proposed project development, impact mitigation and monitoring;
- f) identify any local advisory committees, community groups or synergy groups that exist in the area (that have an interest in the proposed Project) and describe the proponent's involvement with/support of these groups;

- g) describe the process that will be followed that will allow residents impacted by road closures over the Project's life (if any), to provide comment on the selection of alternate routing; and
- h) discuss plans to maintain the public and First Nations consultation process following completion of the EIA review to ensure that the public and First Nations will have an appropriate forum for providing their input and expressing their views on the ongoing development, operation and reclamation of the proposed Project.

APPENDIX

The following information is necessary to be submitted as part of the Application under the EPEA or the *Water Act* for the Power Plant and Coal Preparation Plant facilities and will form part of the integrated application. While required for the EPEA Application for a detailed operating approval this information is typically not required for the EIA report or the EIA completeness decision-making process under Sections 51 and 53 of the EPEA. The Guide to Content of Industrial Approval Applications (September 1999) will be used as reference to develop the EPEA approval application for the power plant, coal wash plant and associated facilities. Separation of the information required for the EIA report from the EPEA operating approval information (technical details) will assist in a thorough and timely review.

Water Supply, Water Management and Wastewater Management

Provide the following information for the power plant and coal preparation facilities:

- a) technical details on how the water requirements (including quantity and quality) will be met;
- b) the design of facilities for the water supply system;
- c) the design of facilities that will handle, treat and store wastewater streams;
- d) the type and quantity of any chemicals used in water supply and wastewater treatment systems;
- e) type and quantity of any process chemicals used in the power plant and coal wash plant;
- f) design details for the potable water and sewage treatment systems for both the construction and operation stages;
- g) the quantity, quality and timing of any proposed water releases or intakes; and
- h) current and proposed water runoff and wastewater monitoring programs.

Air Emissions

Identify the type, rate, volume and source of air emissions for the power plant and coal preparation facilities including point and fugitive sources during construction and operation and decommissioning.

During the operating period consider normal, worst case, upset, start-up and shut-down conditions:

- a) provide the details (type, rate, volume and source) for air emissions including, but not limited to, SO₂, CO, NO_x, TSP, PM₁₀ and PM_{2.5}, heavy metal emissions (e.g., mercury, lead, chromium), selenium, arsenic, radionuclide parameters, hazardous air pollutants from incomplete combustion (PAH's and VOC's) and GHGs;
- b) describe the following:
 - i) any NPRI, PSL1, PSL2 or ARET substances relevant to the facilities;
 - ii) any potential odorous or visual (opacity and colour) emissions from the coal preparation plant and power plant sites;
 - iii) the amount and nature of any acidifying emissions and mercury, probable deposition areas and amounts;
 - iv) the emission control technologies for the proposed Project in the context of available technologies and applicability of Alberta Environment and federal guidelines.
- c) model air emissions from the facilities and relate the modelling results to the Alberta acid deposition management framework or any region-specific environmental management objectives;
- d) model secondary particulate from the facilities and discuss the fate and effects; and
- e) describe the monitoring systems that the proponent will implement to assess air quality and effectiveness of mitigation during the power plant and coal preparation plant operation.

Hydrocarbon, Chemical and Waste Management

Characterize and quantify anticipated hazardous and non-hazardous wastes and recyclables and dangerous goods generated or used in the power plant and/or coal preparation plant. Identify how each waste stream

will be managed, demonstrate that the selected management options are consistent with the current regulatory requirements and industry practice and address the following specifics:

- a) the composition and volume of waste streams including fly ash and bottom ash generated by the proposed Project. Identify how each waste stream will be managed. Demonstrate how the selected practices comply with government regulations including the EPEA Waste Control Regulation and Alberta Environment *Hazardous Waste Storage Guidelines*;
- b) the location, nature and amount of onsite storage of hydrocarbon and other bulk liquids. Demonstrate that storage facilities adhere to Alberta Environment *Guidelines for Secondary Containment of Above-Ground Storage Tanks*;
- c) the chemicals that will be used by the proposed Project. Identify products containing substances that are on NPRI, PSL1, PSL2 or *ARET and those defined as dangerous goods pursuant to the federal Transport of Dangerous Goods Act*;
- d) the storage and management of chemical products and discuss how future changes to these chemical products will be handled to ensure safety and environmental protection;
- e) an evaluation of the proposed disposal methods for the coal ash (fly and bottom). Address the physical and chemical characteristics of these wastes and the environmental significance of their disposal;
- f) the classification of the wastes generated and characterize each stream under the Alberta Environment *User's Guide for Waste Managers*;
- g) the strategy for onsite waste disposal versus offsite waste disposal. Identify the location of any existing and proposed onsite waste disposal locations. Identify on- and off-site waste treatment areas; and
- h) the principles that have been incorporated into the project design for pollution prevention and waste minimization.

Conservation and Reclamation Plan

Provide the following information for the power plant and coal preparation plant within the context of a 10 year EPEA approval period including:

- a) a plan for the integration of reclamation activities and closure planning within the approval period and within the proposed Project life span. The plan should be consistent to that provided in the EUB application and demonstrate integration with the life of mine closure plan;
- b) a detailed conservation and reclamation plan including:
 - i) details of soil reclamation requirements and a table of pre-disturbance land capability classes and post-disturbance land capability classes, demonstrating a return of equivalent land capability;
 - ii) predicted landscape and soil horizon/layer sequences of reclaimed soils that are likely to achieve equivalent land capability;
 - iii) details of approximate reclamation material balance to achieve post-disturbance land capability ratings as specified in i) and ii);
 - iv) the storage and handling of soils and potential locations for soils stockpiles; and
 - v) methods to deal with potential soil compaction and contamination.

Surface Water

Provide a detailed plan and implementation program for the protection of surface water addressing:

- a) a surface water monitoring program to assess the performance of water management systems;
- b) water quality monitoring program for metals and other relevant substances; and
- c) proposed surface runoff control facilities for the power plant and associated facilities, coal wash plant and coal mine.

Groundwater

Provide a detailed plan and implementation program for the protection of groundwater resources addressing:

- a) a groundwater monitoring program for early detection of potential contamination and assistance in remediation planning;
- b) groundwater remediation options to be considered for implementation in the event that adverse effects are detected; and
- c) a program to monitor the sustainability of groundwater production.

Water Quality

Provide a detailed plan that addresses:

- a) surface water, sediment and biological monitoring programs which will be implemented to document the impacts predicted by the environmental assessment;
- b) if a single pass water cooling system (e.g., cooling pond) is used, provide information with respect to water and sediment quality and aquatic biota diversity, density and contaminant levels. Describe seasonal variability. Provide an assessment of contaminants including metals and trace organics, such as PAH's, in wastewater streams and in the receiving streams; and
- c) if a single pass water cooling system (e.g., cooling pond) is used, provide information with respect to the thermal impact on the cooling system due to the power units.