

DRAFT

PROJECT-SPECIFIC GUIDELINES SCOPING DOCUMENT

FOR THE

PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT

MILLENNIUM PROJECT

CAMECO CORPORATION

May 2010

This document has been prepared to meet the requirements for Project-Specific Guidelines for the Saskatchewan environmental impact assessment process under the *Environmental Assessment Act* and to meet scoping requirements under the federal *Canadian Environmental Assessment Act*. The document has been prepared by Saskatchewan Environment and the Canadian Nuclear Safety Commission to assist Cameco Corporation with the environmental impact assessment of the proposed Millennium Project.

Public comment on the document, in draft form, is invited before the document is made final. To ensure consideration, written comments should be submitted by 22 June, 2010 to:

Malcolm K. Ross, Environmental Assessment Branch, Saskatchewan Environment
3211 Albert Street, REGINA, SK S4S 5W6
Phone: (306) 787-6190; Fax: (306) 787-0930; E-mail: malcolm.ross@gov.sk.ca

or

Heather Nicholson, Canadian Nuclear Safety Commission
280 Slater Street, P.O. Box 1046, Station B OTTAWA, ON K1P 5S9
Phone: 1(800) 668-5284; Fax: (613) 995-5086; E-mail: ea@cnsccsn.gc.ca

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1.0 INTRODUCTION

In August 2009 Cameco Corporation (Cameco) submitted to the Saskatchewan Ministry of Environment - Environmental Assessment Branch (MOE, formerly Saskatchewan Environment), the Canadian Nuclear Safety Commission (CNSC) and the Major Projects Management Office (MPMO) a document dated August 4, 2009 and entitled *Millennium Project - License Application and Project Description*.

The Millennium Project is a proposed uranium mine development in northern Saskatchewan. The project is managed and will be operated by Cameco on behalf of the Cree Extension Joint Venture partners (Cameco (41.97%), JCU (Canada) Exploration Company Limited (30.10%) and AREVA Resources Canada Inc. (27.94%)).

For the purposes of the environmental assessment, Cameco is the operator of the Millennium Project.

Cameco has been informed that the proposed mining of the Millennium uranium deposit will require an environmental assessment (EA) under both the *Environmental Assessment Act* (Saskatchewan), hereafter referred to as “The Act”, and the *Canadian Environmental Assessment Act* (CEAA). Cameco is required to conduct an environmental impact assessment (EIA) and prepare an environmental impact statement (EIS) for technical and public review.

This document has been prepared to assist Cameco with the conduct of the EIA and the preparation of the EIS and to meet federal scoping requirements under the CEAA. Information requirements of both federal and provincial agencies have been included in these guidelines so that the information in the EIS should be sufficient to address the environmental concerns of both the Government of Saskatchewan and the Government of Canada.

2.0 ENVIRONMENTAL ASSESSMENT PROCESS

2.1 Federal and Provincial Cooperation in the Environmental Assessment

Under the *Canada-Saskatchewan Agreement on Environmental Assessment Cooperation (2005)* (the Agreement), federal and provincial EA processes, directed respectively by the CEAA and the Act, are coordinated for projects with joint federal and provincial jurisdiction where not limited by individual statutory or process requirements of the respective processes. Under the agreement, MOE is the lead agency and contact for the Millennium Project. Working with MOE on this project is the Canadian Nuclear Safety Commission (CNSC), who is the Federal Environmental Assessment Coordinator (FEAC).

2.2 Requirement for Provincial Environmental Impact Assessment

In Saskatchewan, the proponent of a project that is considered to be a “development” pursuant to Section 2(d) of the *Environmental Assessment Act* is required to conduct an EIA of the proposed

project and prepare and submit an EIS to the Minister of Environment. MOE conducted a technical review of Cameco's project proposal and determined that the project met the definition of a "development". As a consequence, Cameco is required to conduct an EIA of the project and submit an EIS to the Minister of Environment.

Should the proposal to mine the Millennium uranium deposit be found environmentally acceptable on the basis of the EIS, MOE would consider the proponent's applications for the necessary approvals, permits and licences that regulate construction and operation of the facility.

Note that mining of the Millennium uranium deposit may not proceed until the receiving facility for ore and special waste is appropriately permitted for ore processing and management of waste, including tailings.

MOE and other provincial reviewers have identified the following regulatory requirements:

- An application and permit to Construct Pollutant Control Facilities will be required pursuant to *The Mineral Industry Environmental Protection Regulations* under *The Environmental Management and Protection Act*.
- A Forest Product Permit pursuant to *The Saskatchewan Forest Resources Management Act & Regulations* is required for removal or disturbance of any forest products.
- Hazardous waste (including diesel) and waste dangerous goods storage will require approval of the Minister if necessary and must conform to the *Hazardous Substances and Waste Dangerous Goods Regulations*.
- Withdrawal of water from lakes will require approval from the Saskatchewan Watershed Authority.
- Any work near water will require Aquatic Habitat Protection Permits.
- A Special Collection Permit will be required to gather fish/wildlife data or for fish transfer from lakes and streams.
- The proposed road crosses mineral dispositions not controlled by Cameco or its partners. The road should not impair access to these dispositions nor exploration of the dispositions. If, at some point in the future, the road interfered with mining on the non-Cameco dispositions, Cameco would be responsible for re-locating the road.
- An application and permit to construct and operate a potable waterworks and sewage works will be required pursuant to *The Environmental Management and Protection Act*.

2.2.1 Provincial Scope of Project

The provincial project scope for the proposal to develop the Millennium uranium deposit includes:

- Mining the Millennium uranium deposit, including the development of an underground mine using the conventional blasthole stoping mining method; construction and use of a

new clean rock¹ stockpile located adjacent to the proposed mine, including permanent storage of clean rock not consumed as mine backfill. All other mined material, including ore, special waste and tailings would be managed at an appropriately licensed receiving facility (mill). The processing of ore, and management of tailings and other waste materials, is to be considered under separate regulatory applications associated with the receiving facility. Cameco anticipates that the ore and special waste would most likely be transported to the existing Key Lake mill and tailings facilities for processing, upon completion of anticipated modifications at the Key Lake site.

- Construction of a 21-km all-weather road linking the mine site to Provincial Highway 914, joining Hwy. 914 about halfway between Key Lake and McArthur River;
- Operation of water supply, waste water and sewage treatment facilities for the mine operation. Nearby Slush Lake would provide water supply for the mine operation and site facilities associated with the Millennium development. Water and sewage treatment facilities would be constructed with sufficient capacity to meet operational requirements and manage non-routine inflows to the underground mine. Treated effluent would be discharged to Moon Lake.

2.3 Requirement for Federal Environmental Assessment

The Millennium Project would require a licence issued by the CNSC under subsection 24(2) of the *Nuclear Safety and Control Act* (NSCA). Subsection 24(2) of the NSCA is listed under the *Law List Regulations* of the CEAA in respect of the issuance of a licence. Therefore, there is a ‘trigger’ pursuant to paragraph 5(1)(d) of the CEAA for the proposed project.

The proposal involves undertakings in relation to a physical work, and thus there is a ‘project’, as defined in section 2 of the CEAA. There are no identified exclusions for this project, pursuant to section 7 of the CEAA and the *Exclusion List Regulations* of the CEAA.

The proposal is listed under subsection 19(a) of the *Comprehensive Study List Regulations* of the CEAA; therefore, the EA track will be a comprehensive study. At this time, the CNSC is not aware of any potential environmental effects or public concerns associated with this project that would warrant referral to a mediator or review panel pursuant to section 25 of the CEAA.

The Millennium Project is considered to be a Major Resource Project under the Major Resource Project Initiative led by the MPMO.

Under subsection 17(1) of the CEAA, the CNSC delegates to Cameco the conduct of the EA and the preparation of an EIS to inform the CNSC's course of action decision in accordance with subsection 37(1) of the CEAA.

¹ *Clean rock* is non-mineralized rock that does not require direct regulatory control (CNSC 2010). It is differentiated from both *uranium ore*, which contains economically viable levels of uranium and *special waste*, which is low grade mineralized rock (i.e. contains uranium or other contaminants). Both require direct regulatory control because of the potential to release hazardous/nuclear substances and/or the potential to generate acid.

2.3.1 Federal Coordination

To date, the CNSC is the only confirmed Responsible Authority (RA) for the project. Transport Canada (TC) is participating as a likely RA, as the project may require TC approval under section 5 of the *Navigable Waters Protection Act* (NWPA).

Pursuant to the *Federal Coordination Regulations* under the CEAA, the following federal organizations have expert or specialist advice related to their mandate and are identified as Federal Authorities (FAs): Fisheries and Oceans Canada (DFO); Environment Canada (EC); Natural Resources Canada (NRCan); and Health Canada (HC). Indian and Northern Affairs Canada (INAC) and the Canadian Environmental Assessment Agency (CEA Agency) will act in an advisory capacity. The FAs will participate in the project review as requested by the RAs.

2.3.2 Comprehensive Study Process

Following public consultation associated with this document, and pursuant to subsection 21(2) of the CEAA, the RAs must provide a report to the federal Minister of the Environment (federal Minister). The report must include:

- the scope of the project, the factors to be considered in the EA and the scope of those factors (all of which are addressed in this document);
- public concerns in relation to the project;
- the project's potential to cause adverse environmental effects; and
- the ability of the comprehensive study to address issues relating to the project.

The RAs must also recommend to the federal Minister whether the EA should be continued by means of a comprehensive study, or whether the project should be referred to a mediator or review panel. After considering the report and recommendation, the federal Minister will make a decision on the track. If the federal Minister refers the project to a mediator or review panel, the project will no longer be subject to the comprehensive study process. The federal Minister, after consulting the RAs and other appropriate parties, will set the terms of reference for the review, and appoint the mediator or review panel members. As per the Agreement, the province will be immediately informed of this decision and will determine how the province would proceed. If the federal Minister does not refer the project to a mediator or review panel, the project will go back to the RAs to continue the comprehensive study process and the project cannot be referred to a mediator or review panel in the future.

Following the review of the EIS, the RAs will prepare the comprehensive study report, which will be submitted to the federal Minister. The report will be made available for public comment. The federal Minister will consider both the report and submitted comments and issue an EA decision statement and refer the project back to the RAs, who will then take a course of action in accordance with subsection 37(1) of the CEAA.

2.3.3 Federal Scope of Project

Pursuant to section 15 of the CEAA, the proposed scope of the project for the purpose of the federal EA includes the physical works and activities associated with the site preparation, construction, operation and decommissioning (including closure and reclamation) and abandonment of:

- the underground uranium mine, including all associated facilities and ancillary works
- a purpose-built access road up to its connection with the existing road network

The federal scope also includes the transportation of ore and mineralized waste rock along the existing road network to the Key Lake Mill, but does not include the milling of ore or the management of tailings.

2.3.4 Factors of the Assessment

Under the CEAA, RAs are required to consider the factors described in subsections 16(1) and (2) in an EA conducted as a comprehensive study:

- The environmental effects² of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;
- The significance of the effects;
- Comments from the public that are received in accordance with the cooperative EA process;
- Measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project;
- The purpose of the project;
- Alternative means of carrying out the project that are technically and economically feasible and the environmental effects of any such alternative means;
- The need for, and the requirements of, any follow-up program in respect of the project; and
- The capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future.

2.3.5 Scope of the Factors of the Assessment

The proposed scope of the factors to be considered by the RAs in the EA includes the following list of environmental components likely to be affected:

- Atmospheric Environment (including air quality and noise);

² See CEAA definition in section 3.5.1

- Aquatic Environment (including groundwater, surface water, fish and fish habitat, and sediment)
- Terrestrial Environment (including habitat, fauna, flora and soil)
- Socio-Economic Environment (including land and resource use, aboriginal interest, physical and cultural heritage, and navigation).
- Human Health and Safety

2.3.5.1 Spatial Boundaries

The spatial boundaries used in the EA encompass the geographical areas of the environment that may be potentially affected by the project, or are relevant to the assessment of cumulative environmental effects. The boundaries will remain flexible during the assessment to allow the full extent of a likely environmental effect to be considered as further information becomes available. For instance, should the results of modelling demonstrate that there is dispersion of a contaminant that is likely to cause an environmental effect beyond the boundaries identified, it will be taken into account in the assessment.

Site Study Area

The site study area is the project footprint (i.e. where physical works – including mine site infrastructure and both existing and new access roads - would be located).

Local Study Area

The local study area is where measurable changes to the environment resulting from the proposed activities may be anticipated. The geographic boundary will depend on the factor being considered e.g., a local study area defined for the aquatic environment will differ from that defined for the atmospheric environment.

Regional Study Area

The regional study area is where the potential effects of this project may interact with the effects of other projects (including additional operating or proposed mines), resulting in the potential for cumulative effects. The geographic boundary for the regional study areas are also specific to the factor being considered.

2.3.5.2 Temporal Boundaries

The temporal boundaries will encompass the entire lifespan of the project, including site preparation, construction, operation and decommissioning (including closure and reclamation) and abandonment.

2.4 Aboriginal Engagement

The Crown, the provincial and/or federal government, has a constitutional obligation under Constitution Act s.35 to consult with affected Aboriginal peoples before any decision is made that may adversely impact the ability to successfully exercise Aboriginal or treaty rights. The

Crown will utilize the EIS, the EA public consultation process, meetings with Aboriginal groups as necessary and any other relevant sources of information, to inform itself of the project and any cumulative impacts of the development on traditional uses and/or resources and therefore on established or potential Aboriginal and treaty rights, to determine the level of Crown consultation required. Mitigation proposed within the EIS or during the EA process may provide accommodation for any established or potential Aboriginal and treaty rights affected by the proposed project. Resolution of Aboriginal concerns would take place in conjunction with the environmental and regulatory review processes prior to issuing the approvals, licences and permits that are required for the commencement of construction and operation of a project.

2.5 Public Participation

Public participation opportunities will be provided throughout the EA process, including opportunities to review and comment on this document, Cameco's EIS, the federal comprehensive study report, and the province's Technical Review Comments.

A public registry for the EA of the Millennium Project has been established. Information can be accessed via the Canadian Environmental Assessment Registry (CEAR) available at http://www.ceaa-acee.gc.ca/050/index_e.cfm. The CEAR reference number for the project is 09-03-49928. Information can also be found at the province's website at <http://www.environment.gov.sk.ca>. The CNSC has project specific information and information about how to participate in their hearing process at <http://www.nuclearsafety.gc.ca/>.

Project timelines can also be tracked online via the MPMO Tracker, available at <http://www.mpmo-bggp.gc.ca/index-eng.php>.

The Government of Canada, through the CEA Agency, will provide participant funding to successful applicants to assist groups and individuals to take part in the environmental assessment. This funding will be made available whether the EA proceeds by means of a comprehensive study, mediator or review panel. Information on the participant funding program, including the Participant Funding Program Guide and the application form are available at www.ceaa-acee.gc.ca.

To receive funding, successful applicants must participate in the EA by reviewing and commenting on documents, preparing technical analyses, attending meetings or contributing by other means to the EA of the project.

Notices regarding the availability of participant funding will be posted on the CEAR internet site at www.ceaa-acee.gc.ca under reference number 09-03-49928.

2.6 Valued Ecosystem Components

The assessment of environmental effects on the biophysical environment focuses on valued ecosystem components (VECs). VECs are environmental attributes or components identified as

having a legal, scientific, cultural, economic or aesthetic value. To date, the VECs identified for the Millennium Project include:

- Fish and Fish Habitat;
- Water;
- Wetlands;
- Terrestrial Biota and Vegetative Communities;
- Species at Risk (including Woodland Caribou and an apex predator species such as the Gray Wolf);
- Workers and members of the public that may be potentially exposed radiologically as a result of the proposed project.

Cameco should also consult the VEC list previously established by the Northern Saskatchewan Environmental Quality Committee.

VECs for the project should be selected based on defined criteria and their selection justified. VECs must have the potential to be affected by the project and susceptible to change and effect as a result of project-related activities. The selected VECs should serve as indicator organisms and should represent specific habitats and broad species groups, for example, phytoplankton, zooplankton, benthic invertebrates, fish (benthic forager, pelagic forager, large piscivore), birds (piscivores, herbivores, insectivores), aquatic mammals (piscivore, herbivore/omnivore), and terrestrial mammals (ungulates, carnivore, etc.) The selection of VEC species should be based on the ecological importance as well as their potential for exposure to the effects of the project. VECs may also be included due to socio-economic importance (e.g., medicinal herbs, traditional diet). Species of conservation concern identified through baseline data gathering exercises should be included as potential VECs and if screened out in the VEC selection procedure, justification must be provided (i.e. no interaction of the project and critical habitat of the species).

The list of potential VECs and their criteria for selection should be presented to the review agencies and the stakeholders and their input solicited prior to establishing a final list of VECs. Species names for VECs should generally be avoided unless species-specific biology has been incorporated into the modeled assessment.

3.0 PROJECT-SPECIFIC GUIDELINES

These guidelines reflect the requirements and issues that have been raised by federal and provincial officials and their respective Acts and Regulations regarding the proposed mining of the Millennium uranium deposit and identify the information that should be included in the EIS.

Cameco's August 2009 Project Description notes the following points about the project:

- The Millennium uranium deposit is 615 to 730 metres below surface. Two shafts will be excavated to access the deposit and provide ventilation. Cameco has identified

conventional blasthole stoping as their preferred mining method.

- The portion of the deposit targeted for mining is basement-hosted. In order to lower risks associated with the water-bearing sandstone above the basement unconformity, current plans stipulate that mining will not occur within 25 metres of the unconformity³.
- A new clean rock stockpile will be constructed on surface adjacent to the surface facilities. Clean rock not consumed in backfill will remain on surface to be contoured to ensure stability and to blend in with the natural topography upon closure of the mining operation.
- All other mined material, including ore and special waste, [may be temporarily stored on the Millennium site] before transport to the receiving facility (tentatively the Key Lake mill and tailings facility) [for uranium extraction, treatment and/or disposal]. Cameco intends to propose modifications at Key Lake in order to process material from Millennium.
- A 21-km two-lane, all-weather road is to be constructed to provide access to the project. The road will intersect Provincial Highway 914 at km 36, roughly halfway between Key Lake and McArthur River. The road will require approximately 10 stream crossings. An electric transmission line to be constructed by SaskPower is expected to follow essentially the same route as the Millennium access road.
- Slush Lake would provide water supply for the mine operation and site facilities associated with the Millennium development. Water and sewage treatment facilities would be constructed with sufficient capacity to meet operational requirements and manage non-routine inflows to the underground mine. Treated effluent would be discharged to Moon Lake.

The EIA should focus on potential environmental impacts which may result from the implementation of the proposed mining of the Millennium uranium deposit. Information provided in the EIS which is related to the potential impacts of the proposed mining of Millennium should be complete and in sufficient detail to allow assessment of the potential impacts.

Existing information on environmental parameters which will not be affected by the proposed mining of the Millennium uranium deposit, or information which is cited to provide context for the discussion of potential impacts, may be referenced and provided in summary form.

These guidelines should not be considered as either exhaustive or restrictive, as concerns other than those already identified could arise during the investigations associated with the EIA.

Reference to online guidance materials provided by MOE and CEA Agency is recommended (<http://www.environment.gov.sk.ca/Default.aspx?DN=51580b36-1575-4460-a9c8-2a3bf825ae9a> and <http://www.ceaa-acee.gc.ca/default.asp?lang=En&n=DACB19EE-1>). In addition, MOE and the CNSC are prepared to provide advice and assistance throughout the EIA with regard to the

³ Regarding the 25 m plan, CNSC notes to Cameco that mining should have a safe distance away from the unconformity with reasonable justifications.

identification of environmental concerns and appropriate assessment methodologies.

3.1 Executive Summary

An executive summary of the EIS is required. It should briefly summarize and cross-reference the EIS under the following topic areas:

- description of the project;
- purpose of, need for, and alternative means of carrying out the project;
- environmental effects of the project, including the potential spills/malfunctions/accidents;
- any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;
- technically and economically feasible mitigation measures;
- the significance of the environmental impacts;
- the need for, and the requirements of, any follow-up program in respect of the project;
- the capacity of renewable resources that are likely to be significantly affected by the project;
- comments from the public and Cameco's responses; and
- identification of uncertainties in regards to the project elements and/or environmental impacts of the project, including those of a chemical, physical, and/or radiological nature.

The executive summary, which can be under separate cover, should avoid the use of technical terms and jargon. To enhance involvement of northern Saskatchewan residents and First Nations in the public participation process, the executive summary should be translated into each aboriginal language, Cree and Dene, and made accessible in video or audio form.

3.2 Project Description

3.2.1 Project Concept

The EIS should provide a brief, yet comprehensive, description of the proposed Millennium uranium development. The changes that would occur in the vicinity as a consequence of mining the Millennium uranium deposit, and the potential environmental impacts of mining should be placed in context with the existing environmental conditions.

All stages of the proposed mining of Millennium - potential site requirements, construction, operation, maintenance, decommissioning and abandonment - should be described. The EIS should clearly identify where the proposed mining of Millennium differs from information and commitments contained in the project description. This information is to be supported by technical data in sufficient detail and scope to enable an accurate assessment of the potential environmental impacts of the proposed Millennium Project.

Generally, the EIS should include the following information with respect to describing the

project:

- ownership of the project and project components;
- location, using local and regional maps with identifiable features;
- status and map of surface lease and active mineral dispositions relevant to the project;
- the need for the project;
- description of proposed project (including project life, dimensions, plans);
- alternative means of accomplishing the project (see paragraph below);
- materials and power requirements;
- sourcing of materials;
- anticipated schedule for construction and implementation;
- estimated manpower and skill requirements;
- conventional/radiological occupational health and safety considerations;
- accidents and malfunctions during construction, operation and decommissioning;
- emergency measures/contingency plans and procedures;
- technical issues and new technologies specific to the project;

Alternative means are defined as the various technically and economically feasible ways that the project can be implemented. The EIS should discuss, in detail, the criteria (environmental, engineering, socio-economic) used by Cameco to evaluate alternative means, locations and/or designs for the project and justify the environmental acceptability of the preferred option using these criteria. In particular, it is noted that the blasthole stoping mining method seems to result in considerable dilution of ore. The EIS should discuss any alternate methods which might not dilute the ore and result in less waste. The use of reverse osmosis effluent treatment technology should be assessed as one of the alternative effluent treatment methodologies. Cameco should demonstrate that the preferred alternative conforms to best available techniques/best industry practices.

The criteria used to evaluate alternative means should reflect the potential concern for both the short-term (during operations) and long-term (after decommissioning) physical-chemical stability and environmental impacts of the project.

3.2.2 Mining, Milling and Waste Management

3.2.2.1 Mining

The EIS should contain a description of the mining processes necessary to mine the Millennium uranium deposit.

This description should include:

- average and range of ore grades estimated for the Millennium uranium deposit;
- cut-off grades, in percent U_3O_8 for ore, mineralized low grade (special waste) and non-mineralized rock (clean rock), based on current economic conditions or reasoned projections;

- mine design including requirements for stabilizing sandstone and host rocks during shaft sinking and mining by de-watering, freezing or other methods;
- mining sequence and mining methods;
- use of ammonium nitrate-based explosives and environmental fate of residuals;
- ground control methods;
- design of mine ventilation;
- design of underground mine water handling system;
- crushing and grinding of ore, special waste and waste rock (if any);
- hoisting of ore, special waste and waste rock;
- design of surface unloading facility;
- plans for on-site stockpiling of ore grade material should there be delays in the application for, or approval of, the off-site milling and/or tailings management activities;
- ore and special waste storage, and clean rock disposal options (above ground and below ground disposal as backfill aggregate);
- ore and special waste loading for transport;
- contamination control during storage, loading and transport (dust control);
- quantities, use, management and storage of hazardous substances;
- headframe and hoisting facilities;
- surface mine-water handling including water displaced from Slush Lake, sedimentation ponds and effluent treatment systems;
- surface run-off diversion systems;
- surface drainage collection systems;
- fresh water and fire fighting water supply systems; and
- associated mine services including lunchrooms, change rooms (drys), overnight accommodations, garages/shops, warehouses and offices.

3.2.2.2 Waste Rock Management

Cameco's proposal describes a waste rock strategy for the Millennium Project as stockpiling of clean rock on surface and using the clean rock as aggregate in mine backfill. Ore, special waste and resulting tailings would be disposed of at the receiving mill facility.

The EIS should discuss the waste rock management options from the perspectives of maximizing in-mine disposal of waste rock containing potential contaminants and minimizing surface disturbance by locating, if required, any above-ground storage of waste rock in areas already disturbed by construction or mining activities. A thorough assessment of the environmental impacts of these options versus other disposal options, and the benefits and environmental consequences will be required.

Information provided in the EIS should consider the following points:

- geologic profile with drilling and geochemical results;
- characterization of all non-mineralized, mineralized and acid-generating waste material

produced during mining, including results of analyses of the chemical, physical and radiological characteristics, e.g., key metal contaminants, leachate data, potential for oxidation;

- characterization of each lithological unit according to acid-generating potential and contaminant leaching potential based on representative samples to correctly evaluate impacts to the environment. This should include characterization of overburden and waste rock and their potential for contaminant leaching under acidic and neutral pH conditions. Refer to US EPA, 2003; Broughton *et al.*, 1992; and Price, 1997 for discussions on determining selection of a representative sample; and Price, 1997 and MEND, 2009 for the design of a prediction program;
- identification and evaluation of methodologies and parameters that may affect the accuracy of analytical programs and results, e.g., age of material being tested;
- potential for surface water and groundwater contamination by waste rock handling and disposal;
- waste-rock contaminant source terms and leachate concentrations used in contaminant transport assessment;
- incorporation of results of any ongoing test work related to waste rock/special waste rock characterization into modelling analysis;
- dust control measures;
- opportunities for segregation and stockpiling of local soil types for reclamation activities;
- basement rock and sandstone should be managed according to their hazardous properties and if deemed necessary, managed separately;
- management of overburden;
- sampling programs should establish criteria for sample size, the appropriateness of compositing samples, and collection method to meet data quality objectives related to representativeness;
- quality assurance programs for the proper segregation and disposal of clean rock and for the monitoring programs;
- the surficial geology and geohydrology underlying waste rock piles, the composition of any waste rock pads, barriers or liners and collection systems required to mitigate or eliminate drainage and leachate from the piles; and
- facility features and containment systems to collect/control any potentially contaminated runoff water from the waste rock.

3.2.2.3 Milling

As the Millennium Project is considered a stand-alone mine, with ore and special waste to be processed in a receiving facility at another location (tentatively Key Lake) no discussion of milling processes will be required. Cameco intends to address changes to the Key Lake facility to accommodate ore from Millennium in a separate Project Description/EIS process.

3.2.2.4 Waste Management

The EIS should include detailed information regarding the anticipated quality, quantity and potential environmental impacts associated with management programs for all wastes which would be generated, specifying the waste streams that will remain on-site and the waste streams that will be moved to another facility.

Relevant information related to liquid effluent, sewage, surface drainage and atmospheric emissions should be addressed.

Liquid Effluent

Water balances should be provided. Any water not meeting Saskatchewan's *Mineral Industry Environmental Protection Regulation* (MIEPR) limits and the *Metal Mining Effluent Regulations* (MMER) of the federal *Fisheries Act* will have to be treated prior to release. Over the period to which the Millennium Project would be subject to the MMER, any effluents must meet the limits specified under the MMER. During pre-development and when the facility is a recognized closed mine for purposes of the MMER, any effluents would be subject to the General Provisions of the federal *Fisheries Act*.

The selection of water treatment technology should involve the use of the latest developments in water treatment science. The EIS should demonstrate that design objectives of the water treatment facility are based on the principles of pollution prevention using best available techniques economically achievable (BATEA) rather than on simply meeting MMER and MIEPR regulatory limits. Therefore, the EIS should review the treatment technologies or combinations of treatment technologies including but not necessarily restricted to chemical precipitation, reverse osmosis, ultrafiltration, ion exchange, evaporation and biological removal processes. The treatment facility should consider design objectives involving the reduction of uranium releases to the approximate range of 0.1 mg/L, molybdenum releases to less than 1 mg/L and selenium approximating 0.01 mg/L.

The EIS should provide full effluent characterization including radionuclides and hazardous substances (metals, metalloids, organic reagents, etc), beyond those mentioned in the provincial MIEPR and MMER, which should then be screened to identify the potential contaminants of concern.

The EIS should demonstrate that the project will not lead to contaminants and loadings in aquatic receiving systems in excess of the system's assimilative capacity. The EIS should identify where contaminant levels would, and would not, meet Saskatchewan Surface Water Quality Objectives (SSWQO) and Canadian Surface Water Quality Guidelines (CSWQG) downstream from the facility and provide an evaluation of any environmental impacts. The EIS should provide, using formal mixing zone models (e.g., CORMIX), the spatial extent of any mixing zone required to achieve SSWQOs and/or CSWQGs⁴. The predicted spatial extent of these mixing zones should be clearly delineated on detailed site maps for each of the contaminants not immediately achieving their respective federal or/provincial objectives or

⁴ Note: CCME uranium water quality objective for the protection of aquatic life is pending release

guidelines.

The EIS should address:

- treatment processes, including total loadings for treatment and process chemicals; proposed pipelines/surface works;
- anticipated quality and quantity of effluents to be released to the environment and their contribution to current assessments of waste loadings and dispersion in the aquatic receiving system(s). The dispersion of the effluent plume should be used to identify potential exposure sites for monitoring;
- characterization of any thermal discharge and resulting thermal plume circulation across the water column;
- assessment of nutrient input to the watershed;
- location and design of intake and outfall structures;
- quantity, quality and final disposal of slimes, sludges and precipitates from sumps, sedimentation ponds and treated water holding ponds (monitoring ponds) and facility features and handling procedures to minimize spills and environmental effects from disposal;
- proposed points for control, monitoring and final discharge to the environment; and
- contingency plans for malfunctions or accidents.

Sewage

- treatment and/or disposal of sewage and domestic wastewater.

Landfill

- type, quantity and quality of waste to be disposed;
- design of the land fill; and
- decommissioning.

Surface Drainage

- surface diversion and drainage works during site preparation and construction;
- collection, storage, sampling, treatment and release of runoff from stockpiles during site preparation and construction;
- regular analysis of stormwater; and
- design criteria for all drainage and leachate/runoff collection systems, including contingency plans for handling excessive drainage/leachate in an extreme weather event.

Any water not meeting Saskatchewan's *Mineral Industry Environmental Protection Regulation* limits and the *Federal Metal Mining Effluent Regulations* will have to be treated prior to release. Over the period to which the Millennium Project would be subject to the MMER, any effluents must meet the limits specified under the MMER. During pre-development and when the facility is a recognized closed mine for purposes of the MMER, any effluents would be subject to the General Provisions of the federal *Fisheries Act*.

Atmospheric Emissions

- quality and quantity of all airborne emissions e.g., dust (including total suspended particulates (TSP) and particulate matter (PM-10 and PM-2.5)), hazardous substances (e.g., sulphur oxides (SO_x), nitrogen oxides (NO_x), heavy metals, ammonia), radon and radionuclides;
- background data for radon and radionuclides in the vicinity of the return air shaft prior to development, and;
- operational monitoring programs for air quality parameters.

3.2.3 Transportation Corridor

The Millennium Project proposes to construct a dedicated 21-km all-weather private road from km 36 on Provincial Highway #914. The corridor would include a power line to be constructed by SaskPower. All materials coming to and leaving the Millennium site would be transported on the road, including the mine workforce, who would commute daily from the camp at Key Lake.

An analysis of alternative haul road routes and a detailed description of the preferred route for the dedicated all-weather haul road are required. This description should discuss:

- design standards and construction of the preferred haul route;
- alternative locations for stream crossings and preferred sites;
- bridge/culvert designs and standards;
- fish passage design information needs to be provided for all stream crossing locations where there are large bodied migratory fish species present;
- description of the fish species composition, fish habitat features and channel characteristics at each of the stream crossing locations;
- any changes to stream banks or channels at preferred stream crossing sites;
- hydrological data and maximum flood criteria for preferred stream crossing sites;
- any required measures for bank stability and erosion control at the stream crossing sites; and
- any requirements for procedures to restrict unauthorized public access to the haul road.

The EIS should contain a comprehensive description of transportation of the Millennium ore from the proposed mine site to potential receiving facilities (i.e., Key Lake) including reference to current regulatory standards for transportation of radioactive substances. The description should discuss:

- container design and safety criteria. It is noted that the truck illustrated in the project proposal would generally not be watertight. Water draining from wet run-of-mine ore would potentially contain radioactive material or other deleterious substances in suspension or dissolved form, and should be prevented from leaking out of the haul truck;
- trucks, haul cycles, and safety procedures, including traffic control measures for the haul road, use of road salt (if applicable), dust control and severe weather driving restrictions;
- radiological and non-radiological occupational health and safety procedures and training for truck drivers;

- recycling of clean rock from the Key Lake site as building material for the construction of the haul road;
- potential for vehicle and wildlife collisions;
- noise disturbance effects on wildlife distribution and habitat use;
- contingency and emergency management planning for the prevention of, and response to, accidents and ore spills; and
- any additional safety procedures or spill control measures required for stream crossing sites.

To satisfy requirements under the federal *Navigable Waters Protection Act*, the following details should be provided in an application to Transport Canada - Navigable Waters Protection Program and should be summarized in the EIS:

- All proposed works in, on, over, under, through or across any navigable waterway must be clearly identified;
- An appropriately scaled map illustrating the location of all in-water works;
- Photographs of the proposed work location (across, upstream and downstream views are required);
- Any known waterway users (including recreational, commercial and traditional) should be identified and details regarding any consultations with these user groups and/or individuals;
- Detailed drawings (both plan and profile views) of the proposed in-water work;
- Plans and descriptions of all temporary works including coffer dams, temporary crossings, or other infrastructure;
- A description of proposed construction schedules and methods for all in-water works; and
- Details regarding the predicted impact on navigability and a description of any proposed measures to ensure safe navigation during and upon completion of the proposed project.

Based on the information, the predicted impacts to navigation should be determined and measures should be proposed to avoid affecting navigation. (Please note that application to Transport Canada - Navigable Waters Protection Program should be done as early as reasonably possible to avoid potential future delays.)

In addition to the private road and existing transportation route to Key Lake, information on any other transportation routes (including roads and trails) likely to be used during the lifespan of the Millennium Project should be included.

3.2.4 Ancillary Operations and Facilities

Any infrastructure at the Millennium site that would be necessary to accommodate the mining of the Millennium uranium deposit should be described and the potential effects on the environment assessed. For example:

- proposed total surface area that will be disturbed by project activities, including mine,

infrastructure, buildings, permanent and temporary waste rock storage, etc.

- all water supply requirements (e.g., source, volumes);
- potable water sources and treatment;
- anticipated potable water withdrawals from lakes (e.g., Slush Lake), should be discussed in terms of seasonal inflows;
- pumping systems and pipelines;
- roads and sources of road construction materials (quarriable materials, gravel, fill);
- locations and structures (design floods) for any road/stream crossings;
- surface water diversion, collection or storage works (water balances);
- description of the freshwater intake system on Slush Lake including any physical in-water works or undertakings required for its installation and proposed mitigative techniques that will be used to minimize impacts to fish and fish habitat;
- design details of the freshwater intake screen that will be used to ensure fish are not impinged or entrained in the intake system as per DFO (1995);
- description of the pipeline and diffuser that will be constructed in Moon Lake including any physical in-water works or undertakings required for its installation and proposed mitigative techniques that will be used to minimize impacts to fish and fish habitat;
- domestic and industrial waste (types, volumes and disposal methods and waste minimization to be employed);
- location of existing roads/trails;
- proposed monitoring systems and maintenance plans; and
- decommissioning and reclamation plans.

3.2.5 Occupational Health and Safety

The EIS should address both conventional and radiological worker health and safety. Section 52 of *The Saskatchewan Mines Regulations* requires Cameco to prepare a detailed engineered mine design for the proposed project.

The EIS documentation should include:

- calculations of predicted annual radiation doses to all persons, including truck drivers and miners, working at or near the Millennium mine, including as a result of malfunctions and accidents;
- calculations of predicted annual radiation doses to the public, including as a result of malfunctions and accidents;
- potential non-radionuclide hazards to workers in airborne dust and programs that are, or will be, in place to monitor for these hazards;
- engineered controls, programs, Action Levels and a Radiation Protection Code of Practice proposed to control worker radiation doses and intake of radioactive prescribed substances; and
- measures designed to provide for the health and safety of miners and other underground workers.

The EIS should discuss the development of any additional training modules for environmental instrumentation, protection and awareness and how Cameco's commitment to the ALARA (As Low As Reasonably Achievable) principle of radiation protection will be implemented.

Programs should meet the regulatory requirements of *The Occupational Health and Safety Act*, *The Occupational Health and Safety Regulations*, *The Saskatchewan Mines Regulations*, and the *CNSC Radiation Protection Regulations*.

The EIS should include information on health and safety of the public and workers as a result of malfunctions and accidents.

3.3 Description of Existing Environment

3.3.1 Environmental Database

The EIS should contain a description, in terms of local and regional scales, of the existing environment which may be reasonably affected by the proposed mining of the Millennium uranium deposit and allow an evaluation and prediction of the potential environmental effects of the project. The baseline environmental database provided in the appendices of the technical supporting documents should also be provided in an electronic spreadsheet or database format.

The database should include a complete and accurate description of the current status of those environmental parameters that are regulated by federal and provincial agencies at the site and that may be affected by the project

All environmental data that are included in the EIS should be collected using accepted methodologies and be available to MOE and the RAs. These methodologies should be consistent in order to allow comparative use of the data and facilitate ecosystem management.

The database in the EIS should provide a sound basis for not only the EIA of the project, but also the operational environmental monitoring and post-operational decommissioning, reclamation and abandonment. The environmental data should contribute to, and be in a form compatible with, the existing environmental effects monitoring database for the assessment of potential effects on a regional scale.

Therefore, the data in the EIS should satisfy the following criteria:

- the baseline data accurately describe the existing environment that may be affected by the project as proposed;
- the data provide a sound basis for comparative monitoring and the development of sound decommissioning, reclamation and abandonment procedures. This would include the temporal monitoring of appropriate reference and potential exposure stations that will allow for the assessment of any impacts that may occur during the lifespan of the project; and

- the EIS be self-supporting, in terms of data availability and presentation.

Existing data on environmental parameters that will not be affected by the proposed mining development, but are cited to provide context for the discussion of potential impacts, may be referenced or provided in summary form.

Contaminants of Potential Concern

Contaminants of potential concern (COPCs) are the contaminants that exist or could be potentially released in to the environment as a result of the proposed project, and may cause a change to one or more of the environmental components.

Full effluent characterization should be completed for all potential effluent streams released to the receiving environment (see Section 5.2.4 Liquid Effluent). COPCs should be identified from this comprehensive characterization that is to include physical constituents (e.g. Total Suspended Solids), metals (e.g. nickel, molybdenum, zinc), metalloids (e.g., arsenic, selenium), radionuclides (e.g., total uranium, thorium-230, radium-226, lead-210, polonium-210), organic reagents (e.g. kerosene, thiosalts, flocculants, polycyclic aromatic hydrocarbons (PAHs)) as well as major cations and anions potentially associated with osmotic stress and/or bioavailability of COPCs (e.g. potassium, bicarbonates, magnesium, calcium, sodium, sulphate, phosphate).

3.3.2 Climate, Meteorology and Air Quality

The Millennium development's current database of climatic, meteorological and air quality information, including dust and radon data, should be referenced. Any implications for the project, e.g., effects on hydrologic balances, arising from on-site conditions should be discussed. Any use of off-site data must be thoroughly discussed and qualified with an understanding of local and regional variability and the geographic locations of on-site and off site meteorological stations.

The EIS should include the status of operations with respect to climate change parameters.

3.3.3 Geology and Hydrogeology

The EIS should contain a description of the geology and hydrogeology of the Millennium development site sufficient to discuss the implications of the proposal to mine the Millennium uranium deposit. Relevant information on surficial geology/geomorphology should be discussed in terms of any potential effects on the project e.g., ground stability, slumping, and acid/metal release.

The EIS should describe surface gamma dose rates and identify the presence of surface radioactive features, e.g. mineralized outcrops or the presence of boulder trains.

The structural geology such as faults, joints and shears, and their potential impact on the project should also be discussed. The special hydrogeologic characteristics e.g. artesian conditions and

preferential flow channels, which may have an important impact on the project, should be identified and described. Typical cross-sections of the general geology in the vicinity of the ore deposits should be provided showing the geological units and their elevation, groundwater table, and linear structures.

The in situ stress and the geomechanic and hydrogeologic properties of geological formations and weak zones should be obtained either with in situ investigation or from other sources with reasonable confidence. Their implications on the project should be discussed. Seismic activity at the site should be identified and its significance described.

Current Millennium site groundwater information, including results of any groundwater contaminant transport modelling and model sensitivity analyses, should be provided for both operational and post-decommissioning periods. Groundwater that may require pumping from the mine works during shaft sinking, production or due to an underground failure should be characterized to ensure the pumping and treatment capacity is sufficient.

3.3.4 Surface Hydrology and Water Quality

The EIS should discuss the surface hydrology and water quality in any watersheds in the project area that would potentially be affected by the development. Data on watershed areas, drainage patterns, flow rates, bathymetry and water quality (including but not limited to pH, temperature, dissolved oxygen, hardness and alkalinity) should be included. The potential for interaction between surface water and groundwater systems should be discussed for the Millennium shaft area and areas where operations could impact the surface and ground water regimes.

The appropriate environmental baseline hydrological data required to support the development of a site specific surface hydrology model for the Moon Lake study area is to be collected. A site specific hydrological model for the Moon Lake drainage is to be developed and used for plume modelling, water quality predictions, transport modelling and incorporation into the ecological risk assessment modelling.

Should this project be approved, works including the construction and operation of waste water disposal systems, water diversions, surface and groundwater uses and any earthwork in the construction and operation of works will require approval by the Saskatchewan Watershed Authority.

3.3.5 Aquatic and Terrestrial Ecosystems

Relevant information on aquatic and terrestrial ecology likely to be affected by the proposed mining of the Millennium uranium deposit should be included in the EIS. The information should address:

- description of plant communities, including species lists, dominant species and densities for canopy, understory and ground cover;

- soil profiles, including thickness of organic and mineral horizons and buffering capacities;
- numbers and important population characteristics of any potentially affected fish species, aquatic invertebrates, benthic invertebrates, aquatic plants, sensitive habitats, and the possible effects on aquatic resources;
- data on benthic invertebrate community composition with specific emphasis on establishing a baseline database to support the development of any future Environmental Effects Monitoring program including suitable reference and multiple exposure stations. The assessment of the condition of the benthic invertebrate community of Slush Lake and Moon Lake should include an assessment of total benthic invertebrate density, evenness index, taxa richness and similarity index;
- numbers and characteristics of any potentially affected amphibians and reptile species;
- hydrology, bathymetry and limnology of any potentially affected waters and comparable reference waterbodies, including substrate mapping and sediment characterization (e.g., organic carbon, particle size distribution, previously identified COPCs);
- identification of wetlands;
- numbers and characteristics of any potentially affected wildlife species e.g., woodland caribou, moose, bear, aquatic and riparian furbearers, birds, sensitive habitats, resident/migrant populations and species with commercial and/or subsistence values;
- ecologically sensitive or significant areas and species of conservation concern, including species at risk (rare, endangered or threatened) and their habitats. Refer to Committee on the Status of Endangered Wildlife in Canada (COSEWIC) - www.cosewic.gc.ca.

Relevant data on potentially affected soil and vegetation, including lichen, rare and endangered flora, for the project area and associated roads and rights-of-way should be described. Analyses of selected soil and vegetation parameters should establish operational monitoring baseline conditions for previously identified COPCs. Sample site selection should be sensitive to prevailing wind direction.

The EIS should identify the species within the terrestrial and aquatic environments that are important components of food chains leading to, and used by, people living in the region. The status of these species in the impact area in regards to their relative abundance and any measured levels of contaminants in their tissues, especially heavy metals and radionuclides, should be documented.

Any salvage or disposal of merchantable and unmerchantable timber, slash and debris is to be described.

3.3.6 Socio-Economic Environment

The EIS should provide a description of employment, skill levels, training/retraining, jobs targeted for Northerners and contractor opportunities associated with development of the Millennium Project. Commitments to potential local, regional and Saskatchewan suppliers

should be noted.

It is noted that, in the proposal, Cameco re-affirms its commitment to hiring northern contractors and creating opportunities for northern businesses, thus ensuring further economic benefits for local people. Any existing or new measures to be taken in order for Cameco to fulfill this commitment should be described.

The EIS should include the content on the community health profile, regional health services and public health infrastructure in the site, local and regional study areas.

Relevant traditional land use mapping data should be included. The EIS should address the current use of lands and resources for traditional purposes by Aboriginal persons.

The EIS should identify potential heritage sites within the mine footprint and along the proposed access road.

3.4 Public Involvement

Regional residents or organizations should be fully informed of the proposal to mine the Millennium uranium deposit. As interest in the development may extend beyond the project area, Cameco should be prepared to provide project information to, and address issues identified by, persons residing outside of the project area.

It is noted that, in the proposal, Cameco commits to a stakeholder consultation program as part of the Millennium environmental assessment. The program should promote a broader understanding of both the potential impacts of the project and the monitoring programs and results. Elements of the plans for public information/consultation should provide a basis for discussion of enhancement of regional business and employment opportunities.

Efforts should be made to involve the public in issue identification e.g., contribution of traditional knowledge to the determination of VECs, and problem resolution. Activities taken to collect and use traditional knowledge in the selection of VECs should be described in the EIS.

Cameco should contact the Northern Mines Monitoring Secretariat (NMMS) - the Saskatchewan Provincial Agency dedicated to acquiring and disseminating information about Saskatchewan's uranium mining industry, and coordinating the activities of the Environmental Quality Committees within the Northern Administration District. Cameco is expected to continue regular communication promoted through site visits by the Athabasca Working Group and the Athabasca Environmental Quality Committee.

It is further expected that Cameco will:

- provide information through community meetings or various media so that the public can be informed and participate effectively;

- receive information and comments from the public;
- discuss issues and clarify positions and concerns with the public;
- build consensus among key groups or individuals particularly affected by the project, i.e.; the Environmental Quality Committees; and
- inform participants of results and decisions.

The EIS should describe Cameco’s public consultation efforts. Generally, the public includes: local residents, community groups, Environmental Quality Committees, aboriginal groups, environmental groups, the private sector, and any municipal governments. Comments and concerns raised should be documented and their significance evaluated.

3.5 Impact Assessment

3.5.1 General Concepts

The environmental effects of the Millennium Project, and their significance, must be described, including the environmental effects of malfunctions or accidents that may occur in connection with the project.

As stated in the CEAA, “*environmental effect*” means, in respect of a project:

- (a) any change that the project may cause in the environment, including any change it may cause to a listed wildlife species, its critical habitat or the residences of individuals of that species, as those terms are defined in subsection 2(1) of the Species at Risk Act,
- (b) any effect of any change referred to in paragraph (a) on
 - (i) health and socio-economic conditions,
 - (ii) physical and cultural heritage,
 - (iii) the current use of lands and resources for traditional purposes by Aboriginal persons, or
 - (iv) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, or
- (c) any change to the project that may be caused by the environment, whether any such change or effect occurs within or outside Canada.

Any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been, or will be, carried out must be evaluated.

Residual environmental effects which cannot be mitigated during operation and decommissioning should be identified and their significance discussed.

For the purposes of the federal comprehensive study report, the EIS should clearly demonstrate the effects analysis pathway for each identified project-environment interaction. This includes reporting, in tabular format, on interactions that could result in a measurable change (a negative or “adverse” environmental effect), mitigation measures associated with those adverse

environmental effects, identification of residual adverse environmental effects, and the application of significance criteria. EA predictions associated with the proposed follow-up program are to be listed in tabular format.

3.5.2 Regional Impacts

The EIS should discuss whether existing environmental conditions, including other uranium developments in the area, will influence the project. The discussion should address whether the project-specific effects of the proposed Millennium Project, combined with the impacts from existing and planned developments in the region will result in, or contribute to, any regional or cumulative environmental effects. Specific attention should be paid to the potential for cumulative effects of releases from the Millennium project combined with historical, present and potential future releases to the Wheeler River from the Key Lake Operation. A comprehensive Wheeler River baseline would be required to support a long-term monitoring program should there be the potential for cumulative effects.

The concentration of a number of mining related activities in the eastern portion of the Athabasca basin raises the need to assess the cumulative effect of these activities on large mammal populations with large home ranges such as caribou and moose.

CEA Agency (1999, 2007) guidance documents should also be consulted regarding the scope of cumulative impacts to be evaluated in the EIS.

3.5.3 Project-Specific Impacts

The EIS should document and evaluate the significance of positive and negative project-related impacts of the project on the environment. To provide context, the EIS should discuss whether historic exploration and industrial development activities have influenced the current status of the environment, fisheries, wildlife or resource use at the site of the proposed Millennium development.

Impact predictions should be categorized according to defined criteria, and should be as specific and quantitative as possible. Source terms for potential surface water, ground water and atmospheric impacts, together with contaminant transport and plume dispersion modelling results should be provided. For each source term, or combination of source terms, impact predictions should be categorized according to defined criteria (e.g. soil, sediment and water quality objectives) and should be as specific and quantitative as possible.

The EIS should assess the potential effects of any environmental changes on human health or the use of lands, waters and resources for traditional purposes by aboriginal persons and on the quality of any country foods that may be harvested. Potential entry of contaminants of concern in liquid and airborne waste streams, e.g., radionuclides, heavy metals, into food chains and the terrestrial or aquatic environment should be described. As part of human health assessment, regional health services and public health infrastructure in the site, local and regional study areas

should be discussed. Information on project-related contaminant transfer through the human food chain should also be included.

The EIS should discuss the proposal to mine the Millennium uranium deposit with respect to greenhouse gases and other climate change parameters.

The EIS should address the following general elements for alternative mining/waste disposal scenarios:

- hydrologic conditions and potential groundwater management problems e.g., permeability, porosity and fractures, and implications for containment/isolation of potential contaminants from groundwater systems;
- predictions for contaminant flows and concentrations of key contaminants in any potentially impacted ground and/or surface waters based on current groundwater information and results from environmental impact pathway and contaminant transfer pathway models, including model sensitivity analyses;
- potential impacts on the local and regional hydrogeology, including further perturbation by the Millennium development and re-establishment of local and regional groundwater levels following completion of mining;
- evaluation of the potential impacts on any adjacent surface waters, including regional lake levels and water quality;
- prediction of ecological risks to VECs from predictive modelling of concentrations and loadings of contaminants to the environment; and
- potential environmental effects of any ammonium nitrate-based explosive residuals;
- calibration programs for pathway models for the Millennium site;
- contingency plans if contaminant migration predictions are not met;
- monitoring programs for potentially-affected surface and ground waters and associated biota, including monitoring for radionuclides; and
- potential effects of malfunctions, accidents or spills and contingency plans for mitigation and cleanup.

The EIS should discuss the potential effects of the project on the terrestrial environment, including potentially affected wildlife. The impact of noise on terrestrial fauna should be assessed.

The quantity and quality of treated effluents are critical issues for environmental protection. The EIS should address:

- anticipated, short and long term aquatic environmental effects of continued loading of chemical parameters on receiving waters (water quality and sediment quality change) and predicted mixing zone effect;
- potential impacts to benthic invertebrates, fish, wildlife and plants based on contaminant transport modelling results;
- potential impacts on surface and ground waters from waste rock placed at the proposed storage location

- use of abiotic and biotic monitoring programs in evaluating the aquatic and terrestrial environmental effects of this project. This should include the selection of potential reference and exposure locations; and
- results of any studies currently being undertaken of in-lake and in-stream water quality/sediment conditions and biota, and the merits of developing procedures, including biological or statistical indices/measures, for the tracking of changes to aquatic health.

Potential impacts associated with all transportation corridors, including existing roads, that will be or could be used for the Millennium Project are to be assessed.

The EIS should analyse the potential impacts of the 21 km private road. In particular, the terrestrial vegetation and wildlife habitat communities that will be impacted or removed by the road construction should be described and the impacts described in detail. The potential for any material either exposed or used in road construction to be acid generating should be assessed. Particular attention should be given to potential impacts to wildlife movement in the area and the species that could be affected by the road, both during construction and use by vehicles. Potential impacts at any stream crossing locations along access roads should be identified, including the terrestrial impacts of the removal of riparian areas, and appropriate mitigative measures proposed. Setbacks of 90 m and 30 m, respectively, are required for development activities adjacent to fish-bearing and non-fish-bearing waters. Indirect impacts of the road, such as human access to new areas for hunting and resource use should be specified and considered in the EIA. Potential impacts from the use of road salt (if applicable) should be assessed.

The EIS should assess potential heritage sites within the mine footprint and along the proposed access road.

The potential impacts from all contaminant sources should be combined to provide a cumulative impact assessment for the Millennium Project and an assessment of post-decommissioning contaminant loadings to the environment. These potential impacts should also be discussed in the context of criteria for the design of operational monitoring programs and decommissioning, reclamation and abandonment planning.

3.5.4 Effects of the Environment on the Project

The assessment must also take into account how the environment could adversely affect the Millennium Project; for example from severe weather and forest fires. This part of the assessment will be conducted in a step-wise fashion, similar to that described for the foregoing assessment of the project effects. The possible important interactions between the natural hazards and the project will be first identified, followed by an assessment of the effects of those interactions, the available mitigation measures (including facility design), and the significance of any remaining likely adverse effects on the project.

The assessment must take into account any potential effects of climate change on the project,

including an assessment of whether the project is sensitive to changes in climatic conditions during its lifespan e.g., impact on multi-year water balance calculations.

3.6 Mitigation and Contingency Planning

The EIS should discuss existing mitigation measures and current contingency planning at the Millennium site and any changes necessary to manage activities associated with the mining of the Millennium mine.

Although the detailed mitigation and contingency plans would be designed in consultation with regulatory agencies during licensing and would be subject to periodic review during operations, the EIS should document mitigation and contingency plans which would be implemented in the event of containment failures, spills, malfunctions, accidents or inadvertent waste releases.

A hazard analysis or other risk-based approach should be used to identify situations where mitigative measures may be needed, and if an engineering or administrative control solution is not technically and economically feasible, then a contingency plan should be developed.

The EIS should describe fire prevention and suppression programs, including wildfire.

3.7 Monitoring

The EIS should identify the need for, and requirements of monitoring programs for the mining of the Millennium mine.

Although the detailed monitoring programs would be designed in consultation with regulatory agencies during licensing and would be subject to periodic review during operations, the EIS should provide a description of proposed programs e.g., parameters, locations, sampling frequency, methodology. Taking into consideration improved techniques, the monitoring programs should be consistent with baseline data sampling methodology and be compatible with the existing regional environmental database. Should the project be approved and move to licensing, additional extensive baseline characterization may be required to appropriately design and support an operational monitoring program.

The EIS should address:

- monitoring programs for any potential environmental impacts, including potential contaminant loadings to plant and animal species, that are significant in the food web and that are considered relevant VECs;
- monitoring programs to confirm ground water and surface water quality (including sampling at Slush Lake and Moon Lake) in the vicinity of the Millennium mine over the life of the project, including post-decommissioning;
- monitoring programs to confirm predicted potential terrestrial impacts due to the construction and operation of the transportation corridor and verify the effectiveness of

- any proposed mitigation measures;
- monitoring programs to verify underground excavation stability; and
- commitments for operational response procedures to be followed should monitoring identify environmental changes or unforeseen/unacceptable impacts.

Monitoring not only should ensure compliance with regulatory requirements but also should allow the systematic audit of the environmental impact assessment process, specifically the accuracy of predictions and the adequacy of proposed mitigation measures. The monitoring programs, in verifying the environmental impact predictions, should confirm the design criteria for reclamation and abandonment objectives and planning procedures.

Any monitoring program should incorporate and build upon the work undertaken in fulfillment of the environmental effects monitoring requirements of the *Metal Mining Effluent Regulations* of the federal *Fisheries Act*. Development of monitoring programs should be made with reference to the MOE's guidelines document (MOE 1989) and the draft standard N288.4 (CSA 2010).

3.8 Follow-Up Program

Under the CEAA, a comprehensive study must consider the need for, and requirements of, a 'follow-up program'. The purpose of the federal follow-up program is to assist in determining if the environmental effects of the project are as predicted and to confirm whether the mitigation measures are effective. The results will be made available on the CEAR public registry. Therefore, the EIS for the Millennium Project must describe a follow-up program that includes the detailed scope of the program, procedures for adaptive management of project effects, if applicable, schedule and reporting milestones. The CEAA follow-up will be incorporated into the site's environmental management system but should be specifically defined and presented to ensure appropriate reporting to the public registry. Should a licence be granted by the CNSC, the licensing and compliance program would be used as the mechanism for ensuring the final design and implementation of the follow-up program and for the reporting of program results.

3.9 Decommissioning, Reclamation and Abandonment

Although the detailed plans for decommissioning, reclamation, abandonment and financial assurance assessment would be developed in consultation with regulatory agencies during licensing, and would be subject to periodic review during operations, the EIS should provide descriptions of the key elements of these plans.

3.9.1 Conceptual Decommissioning Plan

The EIS should briefly describe conceptual decommissioning plans for the Millennium mine development, including:

- decommissioning objectives;

- alternative procedures for decommissioning site facilities;
- preferred procedures for decommissioning (the MOE supports progressive decommissioning);
- decommissioning, reclamation and abandonment of all related works and surface disturbance;
- identification of acceptable post-operational land use options for the project site;
- environmental mitigation and reclamation measures e.g., contouring, waste stabilization and re-vegetation;
- post-operational landforms and drainage systems; and
- proposed contingency measures.

The decommissioning plan should be developed with reference to the CNSC's regulatory guide G-219 Decommissioning Planning for Licensing Activities (CNSC 2000a).

The plan should address potential post-decommissioning contaminant loadings and impacts to the local drainage system and to groundwater from the decommissioned Millennium workings and waste rock disposal site.

The conceptual plan should reflect project impact assessment, mitigation and monitoring experience. The plan should identify, to the extent possible:

- environmental impacts which can be mitigated by post-decommissioning procedures;
- impacts which cannot be mitigated - these impacts constituting irretrievable environmental losses accruing to the province and to future generations; and
- any potential opportunities for environmental enhancement.

Procedures to ensure that resources are available to implement the plan on mine closure, or at an unscheduled time, should be discussed.

3.9.2 Reclamation

Reclamation planning concepts which should be included in the EIS are described in the Guidelines for Northern Mine Decommissioning and Reclamation (MOE, 2008). These guidelines include criteria for cleanup of soils contaminated by chemical or radioactive materials.

All disturbed sites should be reclaimed as soon as possible after disturbance and operation procedures which may minimize post-operational reclamation and abandonment requirements should be identified. Supporting documentation for proposed reclamation programs should be included in the EIS.

3.9.3 Financial Assurance

If the Millennium Project is approved, a condition of licensing would require that the

decommissioning costs for the development be estimated and a financial assurance plan be implemented. The processes that will be used to estimate the cost of decommissioning the project and ensure the availability of the required funds should be described in the EIS, with reference to the CNSC's regulatory guide G-206 Financial Guarantees for the Decommissioning of Licensed Activities (CNSC 2000b).

3.9.4 Abandonment and Institutional Control

The EIS should include proposed criteria for abandoning the Millennium mine and associated infrastructure and commitments for the monitoring of decommissioning success prior to final abandonment.

Provisions for the long-term institutional control should be discussed, including, but not being limited to:

- record keeping or archiving that fully describes past operations (including containment from spills, malfunctions and accidents), decommissioning plans and assessments, final configurations, and release verification;
- post-abandonment site monitoring and verification;
- need for passive site management;
- land controls; and
- long term financial liabilities for monitoring, care, and maintenance, or contingency remediation.

3.10 Summary

The EIS should provide a concise, complete statement of the anticipated net environmental costs and benefits of the proposed mining of the Millennium uranium deposit in both the short and long-terms. The discussion should include, if possible, any intangible costs and benefits that cannot be expressed in economic terms.

To satisfy CEAA requirements, this statement must include conclusions specifically on whether the project is likely to cause significant adverse effects on the environment.

4.0 REFERENCES

Broughton, L.M., Chambers, R.W., and Robertson, A. MacG. 1992. Mine Rock Guidelines: Design and Control of Drainage Water Quality. Report No. 93301. Prepared by Steffen, Robertson and Kirsten (B.C.), Inc. for Saskatchewan Environment and Public Safety, Mines Pollution Control Branch.

Canadian Environmental Assessment Agency (CEA Agency). 1999. Cumulative Effects Assessment Practitioners Guide. http://www.ceaa-acee.gc.ca/Content/D/A/C/DACB19EE-468E-422F-8EF6-29A6D84695FC/Cumulative-Effects_e.pdf

- Canadian Environmental Assessment Agency (CEA Agency). 2007. Operational Policy Statement. Addressing Cumulative Environmental Effects Under the Canadian Environmental Assessment Act. http://www.ceaa-acee.gc.ca/Content/D/A/C/DACB19EE-468E-422F-8EF6-29A6D84695FC/cea_ops_e.pdf
- Canadian Nuclear Safety Commission (CNSC). June 2000a. G-219 Decommissioning Planning for Licensing Activities. http://www.nuclearsafety.gc.ca/pubs_catalogue/uploads/G219_e.pdf?CFID=10060911&CF_TOKEN=27995734
- Canadian Nuclear Safety Commission (CNSC). June 2000b. G-206 Financial Guarantees for the Decommissioning of Licensed Activities. http://www.nuclearsafety.gc.ca/pubs_catalogue/uploads/G206_e.pdf?CFID=10060911&CF_TOKEN=27995734
- Canadian Nuclear Safety Commission. March 2010. Management of Uranium Mine Waste Rock and Mill Tailings. Discussion Paper DP-10-01 (draft). *Note: This document is undergoing a public review and may undergo substantial change before it is adopted.* http://www.nuclearsafety.gc.ca/pubs_catalogue/uploads/DIS-10-01_management_of_uranium_mining_waste_e.pdf
- Canadian Standards Association (CSA). 2010. Environmental Monitoring Programs at Class 1 Nuclear Facilities and Uranium Mines and Mills. CSA N288.4-10 (draft).
- Department of Fisheries and Oceans (DFO). 1995. *Freshwater Intake End-of-Pipe Fish Screen Guideline*. <http://www.dfo-mpo.gc.ca/Library/223669.pdf>
- Mine Environment Neutral Drainage (MEND). 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials. MEND Report 1.20.1. <http://abandoned-mines.org/pdfs/MENDPredictionManual-Jan05.pdf>
- Ministry of Environment (MOE). 1989. Environmental Monitoring Guidelines for Operational Monitoring at Uranium and Gold Mining and Milling Operations in Saskatchewan. Saskatchewan Environment and Public Safety. Mines Pollution Control Branch.
- Ministry of Environment (MOE). 2008. Guidelines for Northern Mine Decommissioning and Reclamation. EPB 381. <http://www.environment.gov.sk.ca/Default.aspx?DN=52a8a117-332f-4c49-89b9-2f90d79bca5a>
- Price, W.A. 1997. Draft Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Mine Sites in British Columbia. British Columbia Ministry of Employment and Investment.

U.S. Environmental Protection Agency (US EPA). 2003. EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska. Appendix C: Characterization of Ore, Waste Rock, and Tailings.

[http://yosemite.epa.gov/R10/WATER.NSF/840a5de5d0a8d1418825650f00715a27/e4ba15715e97ef2188256d2c00783a8e/\\$FILE/ATT5YPWO/appendix%20c.pdf](http://yosemite.epa.gov/R10/WATER.NSF/840a5de5d0a8d1418825650f00715a27/e4ba15715e97ef2188256d2c00783a8e/$FILE/ATT5YPWO/appendix%20c.pdf)