CONFIDENTIAL REPORT

Conformity Analysis for the Matoush Underground Exploration Program

Prepared for Cree Regional Authority

By Dr. Monique Dubé and Dr. Andrew Harwood
Saskatchewan Research Council
Environment and Forestry

SRC Publication No. 10432-XXXX

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BACKGROUND

Strateco Resources Inc. (Strateco) has submitted an application to the Canadian Nuclear Safety Commission (CNSC) for the excavation of an underground exploration ramp for its uranium mining project on the Matoush claim. The Matoush Project is centrally located within the province of Quebec, situated 260 km northeast of Chibougamau. As such, the project is located within the boundaries of the administrative region governed by the James Bay and Northern Quebec Agreement (JBNQA). The project requires an environmental assessment under Section 5 of the *Canadian Environmental Assessment Act*, and is also being assessed in accordance with the James Bay and Northern Quebec Agreement regime.

The Saskatchewan Research Council (SRC), specifically Dr. Dubé and Dr. Harwood, was retained by the Cree Regional Authority to perform a Conformity Analysis on the following sections of the Environmental Impact Statement (EIS) submitted by Strateco: hydrology, hydrogeology and groundwater quality, surface water and sediment quality, fish and fish habitat. Dr. Dubé holds extensive expertise in environmental assessment, aquatic ecosystem health assessment, cumulative effects and base metal and uranium mining effects assessments. She was a lead reviewer for the 5 year assessment of the Regional Aquatic Monitoring Program for the Athabasca Oil Sands, leads development of cumulative effects assessments for watersheds across Canada, conducts research and assessment of aquatic effects at Saskatchewan uranium mines, and has served since initiation of the Canadian federal Environmental Effects Monitoring Program (Fisheries Act) on the National EEM Science Committee. Dr. Harwood is an aquatic ecologist with experience in environmental assessment and aquatic ecosystem health assessment. Dr. Harwood conducted the initial review which was then reviewed and assessed by Dr. Dubé.

OBJECTIVE

SRC's objective was to perform a Conformity Analysis on the baseline studies, impact assessment and environmental monitoring program components of the environmental impact statement (EIS) related to the physical and biological characteristics of the aquatic environment. The goal of the Conformity Analysis was to identify the most important gaps, lack of information, failings in the methods, and determine if the conclusions were plausible.

APPROACH

A detailed review of the baseline impact assessment and environmental monitoring program components was undertaken, with the findings reported in table format by subject matter (see attached). Many of the general comments on important gaps or failings in the methods refer to the corresponding sections in both Volume 1 and Volume 3. For example, details on baseline hydrology are covered in both Volume 1, Section 4.2.3 and in Volume 3, Section II, parts 2-7. Comments on specific sections are included as necessary.

The sections reviewed were also assessed based on the Directives issued by the Project Evaluating Committee, along with the annex to the directive.

RESULTS

Overall, the EIS is **significantly** deficient in meeting the Directives, is not designed and prepared following the generally accepted rules of good practice, does not accurately define the reference state and reference variability associated with key environmental response variables, and does not assess the positive, negative and indirect impacts of proposed project activities in a manner that will allow for

potential impacts to be measured, tracked and statistically evaluated post development. Experimental design and methodology are not sufficiently described and proposed monitoring and follow-up programs do not meet monitoring standards that are accepted as good practice and include those under which the mine will be regulated post development (i.e., EEM Program). Furthermore, some highly important contaminants of concern associated with uranium mining have not been appropriately addressed including selenium. Development of guidelines for selenium in environmental components is currently one of the most highly discussed issues in North America with water criteria specified at 1 ug/L and proposed tissue based criteria in fish ovaries for example at 15 ug/g dry weight. In the Directives it is stated that the EIS will serve to establish thresholds or levels of acceptability. It is commonly understood that in areas of high mineralization it is typical for CCME guidelines for the protection of freshwater aquatic life and in many cases provincial guidelines to be exceeded naturally. Clearly, if guidelines are already exceeded pre-development, then development of site-specific objectives is obvious to ensure appropriate benchmarks for post development comparisons are available. Use of reference site or baseline station variability for key parameters is a common approach utilized. These issues have not been addressed in the current EIS. Further, it is stated that "aquatic biota are poor and undiversified". In northern ecosystems that are highly oligotrophic, low species diversity for benthos and fish populations is normal and indicative of their unique nature and sensitivity to environmental perturbation. This does not suggest these communities are "poor" and thus should not be protected. It suggests that a more significant effort is required to understand their distribution, abundance and variability in key response measures pre-development so that impact predictions can be evaluated post development and adaptively managed if needed. Finally, baseline monitoring should be designed and implemented in a manner consistent with monitoring programs that would be implemented post development (such as EEM), consistent with follow-up monitoring programs and most importantly in a manner necessary to evaluate cumulative effects.

There was a lack of sufficient good quality baseline data upon which to base predictions of project effects. In certain instances the limitations of the baseline data were addressed in Volume 3, but not accurately portrayed in Volume 1 of the EIS. However, throughout the impact assessment sections of the report there was very little discussion on the validity of the assumptions upon which the predictions of project impacts were based, or the scientific certainty behind the resulting predictions. An objective appraisal of the certainty behind predictions of project impacts is an important aspect of environmental impact assessment because it provides regulators with an indication of the quality of the data upon which the prediction is based, the validity of the assumptions used to model project impacts, and the current state of scientific understanding related to that specific topic. It is clear that some project impacts are easier to predict than others; however, the current impact assessment does not adequately reflect this or identify those impacts around which there is considerable uncertainty.

There are also concerns over the location of some of the monitoring sites within the local study area, and the lack of monitoring sites for all parameters in the regional study area. The current monitoring site locations are not adequate to accurately predict the magnitude or extent of some project-related impacts, and are not adequate to monitor short-, medium- or long-term project effects following development. For example, there is no far field monitoring site downstream of the mine with which to monitor the extent of potential effects from effluent discharge in the regional study area, despite the impact assessment concluding that the release of effluent may impact surface water quality beyond the extent of the local study area. Furthermore, baseline characterization of surface water quality identified parameters naturally above provincial and federal guidelines, yet there was no discussion surrounding the development of site-specific water quality objectives despite guidance on the subject having been published by CCME (2003). There is no indication of replication for statistical assessment, there is no statistical assessment to determine if existing reference and "potentially exposed" areas are statistically different pre-development, reference sites for stream environments do not seem to be described, and it is unclear if sampling for water, sediments, and benthos occurred at the same lake and stream stations.

In addition to these findings we found the EIS to be deficient with respect to the following specific directives issued by the Evaluating Committee:

- The EIS must evaluate the short-, medium- and long-term effects of radioactive contaminants that could potentially be released into the water source from waste rock piles. The proponent must illustrate familiarity with the G-320 regulatory guide from CNSC;
- The EIS must correctly identify impacts associated with radioactive effects, and must consider the Priority Substances List for the releases of radionuclides (Environment Canada and Health Canada 2003), and the recent PROTECT reports from the European Commission (Andersson et al. 2008; Beresford et al. 2008);
- Impact assessment must describe the methods used, and the related uncertainties or biases;
- Special attention must be given to describing the impacts associated with radioactivity;
- Proponent must determine irreversibility thresholds for all impacts, taking the following aspects into account:
    - Permanent or temporary alterations in the aquatic environment as a result of the work;
    - The quality of the water bodies receiving any effluent;
    - Radioactive contaminants liable to be released into the hydrous environment; and
    - Possible alterations in local hydrology (surface and groundwater) caused by dewatering and keeping dry the ramp and underground facilities.
- The monitoring program must ensure the implementation of mitigation measures and compliance with regulatory requirements;
- Identify whether follow-up monitoring will be carried out in-house or contracted out;
- Identify to what extent monitoring will be carried out by Cree-owned companies;
- The monitoring program must be in place to characterize the environment before project-related activities begin;
- Reference state must be defined for the purposes of assessing long-term impacts;
- Must set forth sampling methods;
- Must explain how company will comply with standards regarding public exposure to nuclear material; and
- Using methods recommended by experts, the proponent must determine the minimum level of radiological contamination *in situ* before work begins and characterize element fluxes in the environment, taking into account documented cases of potential contamination from metals associated with uranium exploitation (selenium, molybdenum, etc.).
- The proponent must include a detailed description of its planned protocols for characterization of wastewater, including the installation and number of observation wells required to monitor groundwater quality, taking into account such things as acid mine drainage and leaching potential, toxicity and wind erosion at waste rock and ore stockpile areas.

Our review was limited to the sections outlined in the contractual agreement, thus some of the items identified above may have been adequately covered in sections not included in our review. In particular, the ecological health effects assessment (Volume 1, Section 5.6) may have addressed some of these issues. Nevertheless, there was a distinct lack of discussion surrounding the potential impacts of radioactive contaminants in the sections reviewed.

The detailed results of the Conformity Analysis are presented in attached tables broken down into the following subject areas:

- Hydrology;
- Hydrogeology and groundwater quality;
- Surface water and sediment quality;
- Fish and fish habitat; and
- Monitoring program.

RECOMMENDATIONS

The Conformity Analysis identified a number of issues relating to the lack of sufficient baseline data, the location of current monitoring sites, and the uncertainties underlying some of the predictions of potential impacts. In addition, the present review did not analyze the predictions of the ecological health effects assessment (Volume 1, Section 5.6), or the sections related to cumulative effects (Volume 1, Section 7; and Volume 3, Section III, part 38.7), in which further concerns may arise. We recommend that these sections be thoroughly reviewed. Further recommendations on baseline data requirements, monitoring site locations and information required to reduce the uncertainties related to the prediction of project impacts could then be made.