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December 18, 2009

Cree Regional Authority/Administration regionnale crie

Re: Strateco Resources Uranium Mining Project: Preliminary Review Environmental and Human Health Risk Assessment.

Please find enclosed a copy of my preliminary quality analysis of Section 5.6 "Ecological and Human Risk Assessment" of the Environmental Impact Assessment prepared by Strateco Resources for the purposes of uranium exploration.

If you have any questions regarding the comments enclosed in my initial review please do not hesitate to contact me further.

Sincerely

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Toxicologist

Associate Professor

I have gone through the Environmental Impact Assessment (EIA) document prepared by Strateco Resources paying particular attention to the Environmental and Human Health Risk Assessment components of the EIA.

Baseline and predictive modeling information was utilized to characterize risk to both human and ecological receptors. This information was also employed to determine potential human and wildlife exposure levels to environmental contaminants associated the Strateco Resources Uranium Exploration Project. This is a common approach and is pertinent and suitable for this case.

In general, the Screening Level Human and Environmental Risk Assessment was well written and incorporated a majority of the necessary components of the risk assessment process as outlined in the Canadian Council of Ministers of the Environment (CCME), Health Canada's and the US EPA's Human and Environmental Health Risk Guideline Documents. The risk assessment approach was well defined and relevant for the purposes of assessing both human and environmental risk in this case.

Contaminants of potential concern (COPC) were identified through a screening process. The screening process utilized in this case was appropriate. This approach is commonly utilized in the process of human and environmental risk assessment. The COPC applied in this case were appropriate to the resource development and assessment of risk.

The risk assessment applied three exposure scenarios including "a worst case scenario" where it was assumed that receptors would be exposed to the highest potential contaminant concentrations. This type of method leads to an overestimation of human and environmental risk and is a conservative and valid approach utilized by risk assessors.

Receptor selection was comprehensive, supported by referenced guidelines of Health Canada, the US EPA and the CCME. A sound rationale was provided for receptor selection and was fitting for the site.

Multiple exposure routes in assessing the magnitude of risk associated with potential human and wildlife exposures to chemical substances were considered. Exposure to the maximum likely concentrations of COPC encountered at the site, for each receptor category, was also considered in this case. This approach often leads to an overestimation of risk and is applicable to this case of risk assessment.

The exposure assessment step of the risk assessment process was not clearly defined. Exposure assessment describes and characterizes the likelihood, extent/magnitude, and duration of exposure to COPC. The specific pathways of chemical exposure for each receptor category were defined, however the frequency, duration and probability of such exposures were not discussed in detail.

Numerous assumptions about the characteristics of exposed receptor groups are made for quantitative risk assessments. It is important in the assessment process to outline and define and ultimately choose receptor characteristics that most closely resemble the physical attributes and behavioural patterns of receptors. Reasonable judgement of receptor characteristics must be applied to prevent under or overestimation of potential health risks. It is not clear what physical attributes and behavioural patterns of receptors were chosen to avoid underestimating risk especially in the assessment of human health risk.

Receptor behaviour parameters applied in risk assessments, and perhaps applied in this case, are derived using recommendations of receptor characteristics provided by Health Canada and US EPA (Wildlife) Exposure Factors Handbook. It may be helpful to add a section, Exposure Assessment, to the current risk assessment document that outlines exposure scenarios reflective of site-specific human/wildlife activity patterns at the site. In its present form the receptor activity patterns utilized to assess risk are not indicated.

The exposure frequency to COPC could be more clearly articulated in this case. (Eg. exposure would occur X days per week, X weeks of the year, for an average exposure duration of approximately X years. (a lifetime exposure for carcinogenic COPC).

The nature of the relationship between the received dose (estimated daily intake) and the probability of an adverse biological response was evaluated in this risk assessment. However, the process of calculating the estimated daily intakes through the routes of exposure applied in this case was not provided in detail.

It is assumed however, that the EDIs were calculated using standard mathematical formulas commonly used in the risk assessment process. Were the EDI(s) for each COPC, by each category of human/wildlife receptor, calculated using the process and equations outlined in the US EPA Wildlife Exposure Factors Hand Book and the Health Canada risk assessment guidelines?

Standardized reference values for body weights, volume of air breathed, quantities of soil ingested, and, behavioural patterns of receptor categories identified in this case may have been obtained from the Health Canada Preliminary Quantitative Risk Assessment Guidance Documents (Wildlife information may have been obtained from the US EPA Wildlife Exposure Factors Hand Book), however the information on human receptor characteristics is deficient in the current form of the risk assessment document.

A dose-response relationship was evaluated for COPC identified at the site. The assessment considered whether exposure to COPC, at levels present at the site, would result in an absorbed dose that could pose a risk to human or wildlife health. An estimation of the total daily intake for COPC, considering all potential exposure routes, was calculated. The relationship between the magnitude of the estimated daily intake and the occurrence of an adverse health response was characterized by evaluation of

quantitative data obtained from the regulatory agencies and the scientific literature, an approach which is well established and appropriate for this case.

The estimated human/wildlife exposures (or intakes) were compared to intake levels considered to be safe levels of exposure (benchmarks of toxicity established by Health Canada, USEPA and other regulatory bodies). The COPC were evaluated for their excess lifetime cancer risks and noncancer hazard quotient (HQ). The primary criterion used to characterize human health risk was quantitative (0.2 for HQ and 1 x 10⁻⁵ for risk level).

The Toxicity benchmarks utilized to characterize risk in this case were well summarized, defined and well referenced.

In general the risk assessment was conducted using stringent and conservative assumptions that inherently led to an overestimation of potential exposure and risk. The approach was sensible and adhered to the principles outlined in the guidance documents (Health Canada, US EPA and CCME) commonly utilized in the risk assessment process.

Although the EIA included the majority of health factors (location, environmental setting, disposal of materials, physical hazards) to be considered in the project description section of the report, Strateco Resources could include statements that address the following health factors within the project description of their EIA.

- 1. Human exposure and impact at different stages of the projects life cycle. (construction, operational, maintenance and decommissioning).
- 2. A more thorough characterization of the potentially affected population, including workers and the public. Demographic information was included in the EIA but there was no relation to how potential human exposure may impact any vulnerable groups identified within the population (eg. children, pregnant women, hypersensitive individuals or those who have underlying health conditions).
- 3. The EIA should indicate if there will be any expected changes in exposures over the duration of the project and how this may impact total human exposures.
- 4. Occupational health services should be described.
- 5. Was an EIA practitioner involved in the preparation of the EIA?
- 6. Impacts of past, existing and future projects in the area need to be addressed and the combination with the proposed project.

Human Health Risk Assessment

More clearly characterize the duration and frequency of exposure (eg. the length of time (hours/day, days per week, weeks per year, duration in years) utilized to assess risk.

Qualitative assessment for socio-economic impacts would be appropriate.

Worker Health:

Information and indicators used for health and well-being of the worker should be collected: For example: quantitative information gathered could include injuries, effects

of accidents and malfunctions, days off work or disability days, other health related effects (cancer incidence, respiratory).