

Appendix G18

Letter: *Country Food Letter*



NIRB File No. 03MN107

December 7, 2012

Kelly Senkiw
Environmental Assessment Coordinator
Health Canada, Environmental Assessment Division
99 Metcalfe Street
Ottawa, ON
K1A 0K9

Sent via email: kelly.senkiw@hc-sc.gc.ca

Re: The Nunavut Impact Review Board's 2011 – 2012 Annual Monitoring Report for the Meadowbank Gold Project and Board's Recommendations

Dear Kelly Senkiw:

The Nunavut Impact Review Board (NIRB or Board) released its *2011 – 2012 Annual Monitoring Report for Agnico-Eagle Mines Ltd.'s Meadowbank Gold Project* (Monitoring Report) under separate cover earlier today¹. The enclosed Monitoring Report is based on the NIRB's monitoring activities pursuant to the Project Certificate [004] and Sections 12.7.1 and 12.7.2 of the Nunavut Land Claims Agreement. This report provides findings that resulted from monitoring of this Project that took place from October 2011 to September 2012.

Based upon the Board's review of the monitoring report and other materials related to the Meadowbank Project, the Board has issued the following recommendation in order to assist Agnico-Eagle Mines Ltd. (AEM) in achieving compliance with the Project Certificate [004] and other project-related commitments.

Monitoring of Country Foods – Condition 67

Condition 67 requires that the Proponent develop a program which monitors contaminant levels in country foods and to submit this plan to the NIRB. In 2011, AEM completed a wildlife screening level risk assessment report (WSLRA)² and a preliminary quantitative risk assessment

¹ NIRB, "The Nunavut Impact Review Board's 2011 – 2012 Annual Monitoring Report for the Meadowbank Gold Project and Board Recommendations", letter, December 7, 2012.

² "Wildlife Screening Level Risk Assessment for the Meadowbank Gold Project," Appendix I1 of *Meadowbank Gold Project 2011 Annual Report*, 2012 (<http://ftp.nirb.ca/03-MONITORING/03MN107-MEADOWBANK%20GOLD%20MINE/03-ANNUAL%20REPORTS/02-PROPONENT/2011/01-REPORT/>).

(PQRA)³ in order to meet the requirements of Condition 67. Results in the WSLRA report indicated that the operation of the Meadowbank mine did not appear to be contributing excess risk from chemical contaminants to wildlife residing in the area. The author of the PQRA recommended further studies be conducted, specifically for chromium exposure to caribou and chromium concentration in lichen at both reference and mine site locations. At this time, AEM has not provided any indication as to whether these further studies may be conducted.

As carried by way of a motion at its recent November 2012 meeting held in Arviat, Nunavut the Board invites Health Canada to provide comments on the results of both the WSLRA and PQRA reports as provided by AEM, and to indicate whether or not further information may be required with respect to the monitoring program as outlined in Condition 67.

The Board respectfully requests that Health Canada provide comments regarding these reports to the NIRB by **February 4, 2013**. If you have any questions or require further clarification related to the NIRB's monitoring of the Meadowbank project, please do not hesitate to contact me directly at (867) 793-4633 or sgranchinho@nirb.ca.

Sincerely,



Sophia Granchinho, M.Sc., EP
Technical Advisor & Meadowbank Project Monitoring Officer
Nunavut Impact Review Board

cc: Stéphane Robert, Agnico-Eagle Mines Ltd.
Kevin Buck, Agnico-Eagle Mines Ltd.
Meadowbank Distribution List

Enclosure: The Nunavut Impact Review Board's *2011 – 2012 Annual Monitoring Report for Agnico-Eagle Mines Ltd.'s Meadowbank Gold Project*.

³ "Human Health Preliminary Quantitative Risk Assessment of Consumption of Country Foods for the Meadowbank Gold Project," Appendix I2 of *Meadowbank Gold Project 2011 Annual Report*, 2012(<http://ftp.nirb.ca/03-MONITORING/03MN107-MEADOWBANK%20GOLD%20MINE/03-ANNUAL%20REPORTS/02-PROPONENT/2011/01-REPORT/>).



Health
Canada

Santé
Canada

Safe Environments Directorate
Healthy Environments and Consumer Safety Branch
269 Laurier Ave. W., 4th floor, A/L 4904A
Ottawa, ON K1A 0K9

February 4, 2013

Sent by e-mail to: Info@nirb.ca

Subject: Health Canada's review of the *2011-2012 Annual Monitoring Report for the Meadowbank Gold Project* and Board's Recommendations (*Monitoring of Country Foods – Condition 67*) and comments on the results of the PQRA report (NIRB File No. 03MN107)

Dear Nunavut Impact Review Board,

Health Canada (HC) has reviewed Appendix 12, Human Health Preliminary Quantitative Risk Assessment (PQRA) of Consumption of Country Foods, of the Meadowbank Gold Project's 2011-2012 Annual Monitoring Report per the request received December 7, 2012 to provide comments on the results of the Wildlife Screening Level Risk Assessment (WSLRA) and PQRA with respect to the monitoring program as outlined in Condition 67 of the Board's recommendations.

Please note as per the email sent January 16, 2013 to info@nirb.ca, that HC is unable to provide comments on Appendix 11, WSLRA, as HC does not possess the relevant expertise in the areas of modeling emissions and deposition, environmental transport, fate and/or contaminant uptake by plants or wildlife (country foods). Another department may have the expertise necessary to review the WSLRA.

General

HC was provided with the appendix, *Human Health Preliminary Quantitative Risk Assessment of Consumption of Country Foods for the Meadowbank Gold Project*, by the NIRB after we had finished our review, so have not commented on whether the calculations are appropriate. In the quantitative risk assessment for country foods, HC advises including examples of worked calculations (e.g. Incremental Lifetime Cancer Risk, Hazard Quotient, etc.). If examples of worked calculations are not included, HC is unable to determine if there are calculation errors, misinterpretation of formulas, or inappropriate use of toxicological reference values. If these errors are made, there may be an under or overestimation of risk. We have proceeded with our review under the assumption that the calculations are correct.

Methodology and TRVs to assess risk

In Appendix 12, Section 3.2; Table 3-1 (p. 18), HC notes that in general, the methodology followed in the PQRA matches that of the methodology used in the 2006 proposal, which HC supported overall.

However, for tin (Sn), it is unclear whether the TRV proposed by the proponent is for total, inorganic, or tributyl tin. In order to assess the potential health risk from tin exposure, HC would need the information on which tin species was assessed in developing the HQ's for the country foods in the PQRA.

In order to assess the potential health risk from lead exposure, HC would need the raw occurrence data for lead in country foods that was used in the assessment.

While an extensive discussion of the HQs, based on the provided TRV has been provided, the raw data on the occurrence of arsenic in country foods has not. HC would need the raw occurrence data for arsenic in country foods that was used in the assessment.

In the absence of raw data, HC cannot comment on the comparison of As, Cd, and Pb levels in the country foods presented here and in comparable foods for which it has data. Should the proponent provide this information, HC would be able to review this information and provide comments.

Conclusions presented in HHRA

Based on the information provided, HC has no objection to the conclusions or recommendations of the report.

Other

HC notes that in its 2006 assessment of the EIS, it recommended that a monitoring program be put in place to assess mercury levels in fish from the area. We note that the proponent has put in place a "no fishing" order for the workers onsite, and would consider this an appropriate reason not to include fish consumption in the country foods assessment. That seems to be a robust assumption. Also, the assessment is assuming that the lakes onsite have not influenced the levels of COPCs in other lakes in the area where fishing is permitted and occurring. Have a possibility of migration of fish from the lakes onsite to another water bodies been considered?

In light of the analysis of the external reference values for caribou kidney, the Territorial Governments may want to re-examine existing guidance for the consumption of these organs.

Should you have any questions regarding HC's response, please contact the Kelly Senkiw, Environmental Assessment Coordinator, at 613-941-7997 or via email kelly.senkiw@hc-sc.gc.ca.

Sincerely,



Kathleen Hedley
Director, Environmental Health Bureau
Health Canada, National Capital Region
Tel.: 613-952-7585
Fax: 613-946-9673

cc: Kelly Senkiw, Environmental Assessment Coordinator, Health Canada
Gregory Kaminski, Senior Environmental Health Assessment Specialist, Health Canada

April 10, 2013

To: Nunavut Impact Review Board

CC: Kathleen Hedley, Director, Health Canada- Environmental Health Bureau

From: Kevin Buck (Meadowbank Environment Superintendent); Ryan Vanengen (AE Biologist); Leilan Baxter (Consultant to AEM)

Re.: Response to Health Canada's review of the 2011 HH PQRA for Consumption of Country Foods for the Meadowbank Gold Project

The following is provided in response to Health Canada's requests and recommendations in their review of Agnico Eagle Mines (AE) 2011 HH PQRA for Consumption of Country Foods for the Meadowbank Gold Project (as provided in a letter to NIRB, dated February 4, 2013). In the section General of the letter, Health Canada advised AE to "include examples of worked calculations (eg. Incremental Lifetime Cancer Risk, Hazard Quotient, etc.)". Health Canada appropriately assumed the calculations were correct and the following provides examples of the calculations for their information.

1. Example Calculations

Values for all stages of the calculations presented in the text are provided in Appendix C of the HH PQRA. A complete worked example is provided below for the estimation of risks to adults due to chromium exposure from the moderate consumption of caribou muscle at the external reference location. Because this assessment is based on measured concentrations in soil, water and plant tissue, an estimation of the occurrence of the contaminant of potential concern (COPC) in animal tissue was first required (A), followed by human dose-rate estimation (B), and hazard-quotient calculation (C).

An example for the calculation of lifetime incremental cancer risk is provided for inorganic arsenic (D) under the same scenario.

A) Concentration of the COPC in Animal Tissue

Concentrations of chromium in caribou muscle were calculated using the food chain model developed in Azimuth (2006). The model was developed to include the influence of COPC concentrations in exposure pathways, dietary preferences, ingestion rates and dose-adjustment factors. An example calculation is provided here, and further rationale is found in Azimuth (2006) and the 2011 Wildlife Screening Level Risk Assessment (Baxter Consulting, 2012). References and descriptions of all animal-specific parameters (body weight, intake factors, time onsite) are provided in Table 1.

$$\text{Caribou muscle concentration} = \sum(\text{Soil, water, food dose}) \times \text{Tf} \times \text{caribou weight} \times \text{time onsite}$$

Where:

Soil dose = maximum soil concentration x soil intake factor
e.g. = 201 mg/kg dw x 0.0013 kg dw/kg ww/d

$$= 0.271 \text{ mg/kg ww/d}$$

Water dose = maximum water concentration x water intake factor

e.g. $= 0.0005 \text{ mg/L} \times 0.064 \text{ L/kg ww/d}$
 $= 0.000 \text{ mg/kg ww/d}$

Food dose = $\sum(\text{sedge, lichen, berry concentration} \times \% \text{ diet}) \times \text{food intake factor-wet}$

e.g. $= [(16.5 \times 30\%) + (36.3 \times 65\%) + (3.16 \times 5\%) \text{ mg/kg ww}] \times 0.066 \text{ kg ww/kg ww/d}$
 $= 1.888 \text{ mg/kg ww/d}$

Tf (transfer factor, feed-to-muscle¹) = 0.0055 d/kg (USEPA, 2005)

Caribou weight = 75 kg ww (Dauphine et al. 1976)

Time in area = 33 % (Senes, 2008)

Therefore, e.g.:

$$\begin{aligned} \text{Caribou muscle concentration} &= (0.271 + 0.000 + 1.888 \text{ mg/kg ww/d}) \times 0.0055 \text{ d/kg} \times 75 \text{ kg} \times \\ &\quad 33\% \\ &= 0.294 \text{ mg/kg ww} \end{aligned}$$

B) Human Dose – Adult

As in Wilson (2006), daily exposure from consumption of country foods (EIF; ug/kg body weight/d) was calculated based on Health Canada (2004a) as:

$$\text{EIF} = (\text{CF} \times \text{DCR} \times \text{BAIG}) / \text{BW}$$

Where:

CF = concentration in food item (mg/kg ww)
 e.g. = 0.294 mg/kg ww

DCR = daily consumption rate of food item (g/d)
 e.g. = 86 g/d (moderate)

BAIG = bioavailable fraction via ingestion route (assumed to be 1)

BW = body weight of person (kg)
 e.g. = 70.7 kg

¹ For concentrations in kidney or liver, an additional muscle-to-organ transfer factor is included as a multiplier in the equation (see Appendix C of HH PQRA)

Therefore, e.g.:

$$\begin{aligned}\text{EIF} &= (0.294 \text{ mg/kg ww} \times 86 \text{ g/d} \times 1) / 70.7 \text{ kg} \\ &= 0.357 \text{ ug/kg/d}\end{aligned}$$

C) Hazard Quotient

Based on the estimated exposure from moderate consumption of caribou muscle by an adult, the hazard quotient is calculated as:

$$\text{HQ} = \text{EIF (ug/kg body weight/d)} / \text{TDI (ug/kg body weight/d)}$$

Where:

$$\begin{aligned}\text{EIF} &= \text{exposure from consumption of country foods} \\ \text{e.g.} &= 0.357 \text{ ug/kg/d}\end{aligned}$$

$$\begin{aligned}\text{TDI} &= \text{tolerable daily intake} \\ \text{e.g.} &= 1 \text{ ug/kg/d (HC, 2004a)}\end{aligned}$$

Therefore, e.g.:

$$\begin{aligned}\text{HQ} &= 0.357 \text{ ug/kg/d} / 1 \text{ ug/kg/d} \\ &= 0.357 \\ &= 0.4\end{aligned}$$

Based on recommendations in Health Canada (2004a) for single-substance exposure, a hazard quotient ≤ 0.2 indicates negligible risk.

D) Lifetime Incremental Cancer Risk

For carcinogenic substances (inorganic arsenic), risk was determined assuming consumption throughout the lifetime, based on the incremental lifetime cancer risk (ILCR). After calculating the EIF for arsenic, as above, the ILCR is calculated as:

$$\text{ILCR} = \text{EIF (ug/kg body weight/d)} \times \text{slope factor ((ug/kg/d)}^{-1})$$

Where:

$$\begin{aligned}\text{EIF} &= \text{exposure from consumption of country foods} \\ \text{e.g.} &= 4.22 \times 10^{-5} \text{ ug/kg/d}\end{aligned}$$

$$\text{slope factor for inorganic arsenic} = 0.0017 \text{ ((ug/kg/d)}^{-1}) \text{ (Health Canada, 2004a)}$$

Therefore, e.g.:

$$\begin{aligned}\text{ILCR} &= 4.22 \times 10^{-5} \text{ ug/kg/d} \times 0.0017 ((\text{ug/kg/d})^{-1}) \\ &= 7.18 \times 10^{-8}\end{aligned}$$

Based on recommendations in Health Canada (2004a) for single-substance exposure, cancer risk is found to be “essentially negligible” (*de minimis*) when $\text{ILCR} \leq 1 \times 10^{-5}$.

2. TDI - Tin

In Section Methodology and TRVs to assess risk of the letter, Health Canada indicated that to assess potential risk from tin exposure, they would need to know “*which species of tin (Sn) was assessed in developing the HQs for the country foods in the PQRA*”. The tolerable daily intake (TDI) used in this assessment (200 ug/kg/d) was obtained from ITER (2012), based on Sinkeldam et al. (1981), and is for inorganic tin. The risk assessment assumes inorganic tin is 100% of total tin measured in soil, water and plant tissue, since organotins are most commonly anthropogenically produced (Fent, 1996).

3. Concentration of As, Cd, Pb in food items

Furthermore, Health Canada indicated that they would need the raw occurrence data for arsenic, cadmium and lead in country foods in order to comment on the levels estimated in this assessment, and in comparable foods for which it has data. These values are found in Appendix C of the HH PQRA, and summarized in Table 2.

4. Migration of Fish Offsite

Lastly, in Section Other of the letter, Health Canada noted that in its 2006 assessment of Meadowbank’s EIS, it recommended a monitoring program for Hg in fish. HC noted that AEM has implemented a no fishing policy for workers onsite, which is an appropriate reason not to include fish in the PQRA, unless it is possible that fish from onsite lakes have migrated to offsite lakes where fishing occurs, and requested consideration of this possibility.

Pre-construction studies in the Baseline Aquatic Ecosystem Report (BAER, 2005) indicated an absence of fish movement between lakes, despite suitable conditions. This was confirmed through hoop net sets between lakes and strontium analysis in landlocked arctic char otoliths. Since no arctic grayling have been collected near the mine site and no anadromous fish species have been found to inhabit lakes in the Meadowbank area, no defined migration occurs. As a result, movement of fish from onsite lakes to those where fishing occurs is considered to be extremely unlikely.

If you have any questions, don’t hesitate to contact me.



Ryan VanEngen MSc.

519.400.7979 ryan.vanengen@agnicoeagle.com

Environment Biologist- Meadowbank Mine

References

Azimuth, 2006. Wildlife Screening Level Risk Assessment for the Meadowbank Site. Prepared by Azimuth Consulting Ltd. for Cumberland Resources Ltd. 2006.

BAER, 2005. Meadowbank Gold Project Baseline Aquatic Ecosystem Report. Cumberland Resources Ltd. October, 2005.

Baxter Consulting Services (Baxter), 2012. Wildlife Screening Level Risk Assessment for the Meadowbank Gold Project. Prepared for Agnico-Eagle Mines Ltd.

Fent, K. 1996. Ecotoxicology of organotin compounds. *Critical Reviews in Toxicology*, 26(1):1-117.

Health Canada. 2004a. Federal Contaminated Site Risk Assessment in Canada – Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA) and Part II: Health Canada Toxicological Reference Values (TRVs). Environmental Health Assessment Services, Safe Environments Programme, Health Canada, Ottawa, Ontario.

ITER (2012) International Toxicity Estimates for Risk (ITER) database. Bethesda, MD, National Institutes of Health, National Library of Medicine, Toxicology Data Network (TOXNET) (<http://toxnet.nlm.nih.gov>. Accessed March, 2012.

Sinkeldam, E.J., Dreef-van der Meulen, E.J. and M.L. Willems. 1981. Chronic (115-week) oral toxicity study with stannous chloride in rats. Report No. R6372. Central Institute for Nutrition and Food Research, Netherlands. Unpublished report, submitted by Thomassen & Drijver-Verblifa NV, Deventer (Netherlands) to WHO/FAO. As cited in: Toxicological evaluation of certain food additives: tin and stannous chloride. 26th Report of the Joint FAO/WHO Expert Committee on Food Additives; International Programme on Chemical Safety, World Health Organization, Geneva, Switzerland. Food Additives Series 17, 1982.

USEPA, 2005. The Hazardous Waste Companion Database. Human Health Risk Assessment Protocol (HHRAP) for Hazardous Waste Combustion Facilities, Final. United States Environmental Protection Agency. Available at: <http://www.epa.gov/wastes/hazard/tsd/td/combust/risk.htm>. Accessed March, 2012.

TABLES

Table 1: Animal-specific parameters used in the 2011 HH PQRA; as presented in Meadowbank's 2011 Wildlife SLRA.

Parameter	Value	Reference	Notes
Caribou			
Body weight	75 kg wet	Dauphine, 1976	Smallest body weight used
Water intake factor	0.064 L/kg wet/day	US EPA, 1993	Based on allometric equation for all mammals (L/day) $(0.099 \cdot (BW)^{0.90})$
Soil intake factor	0.0013 kg dry/kg wet/day	Beyer et al., 1994	Assumed 5% of dry food ingestion rate (general rate for mammals)
Food intake factor - ww	0.066 kg wet/kg wet/day	Not available	Moisture in food assumed to be 59% as per diet moisture calculation
Food intake factor - dw	0.027 kg dry/kg wet/day	US EPA, 1993	Based on total dry food intake for herbivorous mammals (g/day) $(0.577 \cdot (BW)^{0.727})$
Time onsite	33%	Senes et al., 2008	
Canada Goose			
Body weight	2 kg wet	Mowbray et al., 2002	Smallest body weight used
Water intake factor	0.044 L/kg wet/day	US EPA, 1993	Species profile data for Canada Goose
Soil intake factor	0.0006 kg dry/kg wet/day	US EPA, 1993	Assumed 8.2% of dry food ingestion rate
Food intake factor - ww	0.032 kg wet/kg wet/day	US EPA, 1993	Species profile data for Canada Goose
Food intake factor - dw	0.008 kg dry/kg wet/day	Not available	Moisture in food assumed to be 76% as per diet moisture calculation
Time onsite	33%	Not available	Based on value for caribou (also migratory)

References for Table 1

Dauphine, T.C. Jr. 1976. Biology of the Kaminuriak population of barren-ground caribou: Part 4. Report Series No. 38, Canadian Wildlife Service.

Mowbray, T.B., C.R. Ely, J.S. Sedinger and R.E. Trost. 2002. Canada Goose *Branta canadensis*. In: A. Poole and F. Gill (eds.). The Birds of North America. No. 682. Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Senes Consultants Ltd. 2008. Final Report – Screening Level Environmental Effects Assessment Proposed Kiggavik Project. Report prepared for Areva Resources Canada Inc.

USEPA (United States Environmental Protection Agency). 1993. Wildlife exposure factors handbook, EPA/600/R-93/187. December 1993. Available: www.epa.gov/ncea/wefh.html.

Table 2. Estimated concentrations of arsenic, cadmium and lead in the assessed food items. Assumptions used in calculating animal dose rates are provided in Section 3.1 of Meadowbank's 2011 Wildlife SLRA. Animal dose rates were multiplied by additional bioaccumulation and muscle-to-kidney or muscle-to-liver transfer factors, as described in Section 3.1.1 of the HH PQRA to obtain the values presented here.

Food Item	Estimated Concentration (mg/kg ww)		
	Arsenic	Cadmium	Lead
Caribou muscle			
Onsite	0.000	0.003	0.008
External reference	0.000	0.001	0.004
Caribou kidney			
Onsite	0.001	5.724	0.263
External reference	0.000	2.437	0.142
Caribou liver			
Onsite	0.000	0.802	1.984
External reference	0.000	0.341	1.066
Canada goose muscle			
Onsite	0.001	0.008	0.114
Near-site	0.000	0.002	0.015
External reference	0.000	0.002	0.011



NIRB File No.: 03MN107
NWB File No.: 2AM-MEA0815

November 27, 2013

Kelly Senkiw
Environmental Assessment Coordinator
Health Canada, Environmental Assessment Division
99 Metcalfe Street
Ottawa, ON
K1A 0K9

Sent via email: kelly.senkiw@hc-sc.gc.ca

Re: The Nunavut Impact Review Board's 2012 – 2013 Annual Monitoring Report for the Meadowbank Gold Project and Board's Recommendations

Dear Kelly Senkiw:

The Nunavut Impact Review Board (NIRB or Board) issued its *2012 – 2013 Annual Monitoring Report for Agnico Eagle Mines Ltd.'s Meadowbank Gold Project* (Monitoring Report) to Agnico Eagle Mines Ltd. (AEM) under separate cover earlier today¹. The enclosed Monitoring Report is based on the NIRB's monitoring activities pursuant to the Project Certificate [004] and Sections 12.7.1 and 12.7.2 of the Nunavut Land Claims Agreement. This report provides findings that resulted from monitoring of this Project that took place from October 2012 to September 2013.

Based upon the Board's review of the monitoring report and other materials related to the Meadowbank Project, the Board has issued the following recommendation in order to assist AEM in achieving compliance with the Meadowbank Project Certificate [No. 004] and other project-related commitments.

Monitoring of country foods – Condition 67

Meadowbank Project Certificate [No. 004] Condition 67 requires the Proponent to develop a program which monitors contaminant levels in country foods and to submit this plan to the NIRB. In 2012, the Board invited Health Canada to provide comments on the wildlife screening level risk assessment (WSLRA)² and a preliminary quantitative risk assessment (PQRA)³ report

¹ NIRB Letter to AEM, 2013. "The Nunavut Impact Review Board's 2012 – 2013 Annual Monitoring Report for the Meadowbank Gold Project and Board Recommendations", November 27, 2013.

² "Wildlife Screening Level Risk Assessment for the Meadowbank Gold Project," Appendix I1 of *Meadowbank Gold Project 2011 Annual Report*, 2012 (<http://ftp.nirb.ca/03-MONITORING/03MN107-MEADOWBANK%20GOLD%20MINE/03-ANNUAL%20REPORTS/02-PROPONENT/2011/01-REPORT/>).

prepared by AEM in order to meet the requirements of Condition 67, and to indicate whether or not further information may be required with respect to the monitoring program. With respect to the PQRA report, Health Canada indicated that it would require additional information to provide comments on the human health assessment that was completed by AEM. The request for additional information was forwarded to AEM and in turn AEM responded and provided the information requested by Health Canada. To date, the Board has not received any further response or comment from Health Canada in regards to this additional information that was requested from, and provided by, AEM.

As carried by way of a motion at its recent November 2013 meeting held in Cambridge Bay, Nunavut the Board invites Health Canada to provide comments on the additional information provided by AEM with respect to the PQRA report and to indicate whether or not further information may be required with respect to the monitoring program as outlined in Condition 67.

The Board respectfully requests that Health Canada provide any comment within 60 days' receipt of these recommendations.

Should you have any questions or require further clarification regarding this request or related to the NIRB's monitoring program for the Meadowbank project, please contact the undersigned directly at (867) 793-4633 or sgranchinho@nirb.ca.

Sincerely,



Sophia Granchinho, M.Sc., EP
Senior Technical Advisor & Meadowbank Project Monitoring Officer
Nunavut Impact Review Board

cc: Stéphane Robert, Agnico Eagle Mines Ltd.
Kevin Buck, Agnico Eagle Mines Ltd.
Meadowbank Distribution List

Enclosure: The Nunavut Impact Review Board's 2012 – 2013 Annual Monitoring Report for Agnico Eagle Mines Ltd.'s Meadowbank Gold Project.

³ "Human Health Preliminary Quantitative Risk Assessment of Consumption of Country Foods for the Meadowbank Gold Project," Appendix I2 of *Meadowbank Gold Project 2011 Annual Report*, 2012(<http://ftp.nirb.ca/03-MONITORING/03MN107-MEADOWBANK%20GOLD%20MINE/03-ANNUAL%20REPORTS/02-PROPONENT/2011/01-REPORT/>).



Health Canada Santé
Canada Canada

Safe Environments Directorate
Healthy Environments and Consumer Safety Branch
269 Laurier Ave. W., 4th floor, A/L 4904A
Ottawa, ON K1A 0K9

January 27, 2014

Sent by e-mail to: Info@nirb.ca

Subject: Health Canada's review of the additional information provided regarding the *2011-2012 Annual Monitoring Report for the Meadowbank Gold Project, 2012* (NIRB File No. 03MN107)

Dear Nunavut Impact Review Board,

Health Canada (HC) submits this letter in response to the NIRB's November 27, 2013 letter requesting input on additional information in the report, "Appendix I2: Human Health Preliminary Quantitative Risk Assessment (PQRA) of Consumption of Country Foods", (Appendix I2 was provided with the 2011-2012 Annual Monitoring Report), with respect to the monitoring program as outlined in Condition 67 of the Board's recommendations. The NIRB had previously requested HC's review of the PQRA on December 7, 2012, to which HC had responded on February 4, 2013. The Appendices to the PQRA were not made available to HC until January 28, 2013, therefore they were not reviewed prior to HC's response.

HC reiterates that it has not reviewed the report, "Appendix I1: Wildlife Screening Level Risk Assessment" (WSLRA), as HC does not possess the relevant expertise in the areas of modeling emissions and deposition, environmental transport, fate and/or contaminant uptake by plants or wildlife (country foods). Another department may have the expertise necessary to review the WSLRA.

HC has reviewed the Appendices to the PQRA report, as well as the additional information provided by Agnico Eagle Mines Ltd (AEM) on April 10, 2013, and provides the following comments for the NIRB's consideration.

General

HC reviewed the worked calculation examples provided by AEM and has not identified any concerns.

Methodology and TRVs to assess risk

Tin (Sn)

The toxicological reference value (TRV) chosen by AEM for inorganic tin is more conservative than the value supported by HC. HC agrees with the proponent's two assertions that it is unlikely tributyl tin would be naturally present in the environment and that it is unlikely to represent a concern in the context of the mine. HC has no further questions with respect to the levels of tin modeled in country foods.

Arsenic (As)

The levels of exposure to total arsenic from country foods assessed were negligible in comparison to the levels of total dietary exposure presented in the Canadian Total Diet Study (2007). Therefore, HC has no further questions with respect to levels of arsenic in the country foods assessed in the PQRA.

Cadmium (Cd)

HC agrees with AEM's discussion on the potential health risks posed by cadmium. HC has no further question with respect to the levels of cadmium in the country foods assessed in the PQRA.

As previously mentioned in HC's letter to the NIRB dated February 4, 2013, HC reiterates that the Territorial Governments may want to re-examine existing guidance for the consumption of caribou organs (liver and kidney).

Lead (Pb)

The predicted values for the levels of lead in country foods for both the onsite and external reference site are within an order of magnitude of each other, according to the data provided in the PQRA. HC compared several estimates of total dietary exposure to Pb with the predicted daily exposure estimates to Pb by moderate and high consumers of caribou kidney and liver; and Canada goose muscle, provided in the PQRA (refer to attached Appendix 1). In the case of caribou liver, moderate consumption of this country food, from the project site or external reference site, is predicted to exceed the 90th percentile total dietary exposure estimates in both toddlers and in teens/adults (for the general Canadian population); and, this moderate consumption is also predicted to exceed the mean total dietary exposure to Pb by First Nations populations living on reserve, as found in the 2008/2009 report of the First Nation Food, Nutrition & Environment Study (Chan et al, 2011).

Health Canada recommends that dietary exposure to lead should be As Low as Reasonably Achievable (ALARA principle)¹. If the predicted Pb residue levels and the estimates of exposure to Pb in the country foods included in the assessment are accurate, some concerns about the consumption of country foods obtained from the project site (and the external reference site) exist. HC notes the uncertainty in some of the lead concentrations in country foods that were used in the exposure model (AEM asserted that the level of Pb in the onsite sedge sample was likely mis-reported as it is much higher than other samples) and the uncertainty associated with the use of conservative, predictive models employed to estimate Pb levels in the country foods assessed. Given these uncertainties, HC suggests sampling caribou kidney, caribou liver and Canada goose muscle at both onsite and external reference locations in order to establish the current Pb levels in these country foods. This would also serve as a benchmark for future assessments of lead in country foods from this site. If the background levels of lead in these country foods are determined to be high in the region, then it may be appropriate to consider risk management options.

Other – Migration of Fish Offsite

HC considers AEM's response to the question regarding migration of fish offsite to be sufficient. HC has no further questions on the topic of including a monitoring program for levels of mercury in fish from the site.

¹ Health Canada. 2011. Food Directorate Updated Approach for Managing Dietary Exposure to Lead. http://www.hc-sc.gc.ca/fn-an/securit/chem-chim/envIRON/lead_strat_plomb_strat-eng.php

Should you have any questions regarding HC's response, please contact Kelly Senkiw, Environmental Assessment Coordinator, at 613-941-7997 or via email, kelly.senkiw@hc-sc.gc.ca.

Sincerely,



Nicole Côté
Manager, Environmental Assessment Division
Health Canada, National Capital Region
Tel.: 613-952-8267
Fax: 613-946-9673
Email: Nicole.cote@hc-sc.gc.ca

cc: Kelly Senkiw, Environmental Assessment Coordinator, Health Canada
Gregory Kaminski, Senior Environmental Health Assessment Specialist, Health Canada

References

Chan, L, Receveur, O, Sharp, D, Schwartz, H, Ing, I and Tikhonov, C. (2011). First Nation Food, Nutrition & Environment Study (FNFNES): Results from British Columbia (2008/2009). Prince George, BC: University of Northern British Columbia, [accessed: January 9, 2014]:
http://www.fnfnesc.ca/docs/BC%20Reports/FNFNES_Report_BC_FINAL_PRINT_v2.pdf.

Health Canada. Canadian Total Diet Study. 2007. (and various years).
www.hc-sc.gc.ca/fn-an/surveill/total-diet/index-eng.php

Encl.

Appendix 1. Predicted exposure to lead from caribou kidney, caribou liver or Canada goose muscle compared to total dietary exposure to lead.

Appendix 1: Predicted exposure to lead from caribou kidney, caribou liver or Canada goose muscle compared to total dietary exposure to lead. Only those values exceeding one of the total dietary intake assessments are presented. All values are in units of (ug/kg bw/d).

Country Food and Human Consumer	Predicted lead exposure – moderate consumption*	Predicted lead exposure – high consumption*	Internal Health Canada probabilistic lead exposure Assessment – median ⁺	Internal Health Canada probabilistic lead exposure Assessment – 90 th percentile ⁺	Final Human Health State of the Science Report on Lead**	FNFNES***
Caribou kidney onsite/ toddler	-	0.192	0.195	0.363	0.1	0.23
Caribou kidney external reference/ toddler	-	0.103				
Caribou kidney onsite/ adult	-	0.108	0.069	0.148		
Caribou kidney external reference/ adult	-	-				
Caribou liver onsite/ toddler	0.685	1.443	0.195	0.363		
Caribou liver external reference/ toddler	0.368	0.775				
Caribou liver onsite/ adult	0.365	0.814	0.069	0.148		
Caribou liver external reference/ adult	0.196	0.437				
Canada goose muscle onsite/ toddler	-	0.256	0.195	0.363		
Canada goose muscle external reference/ toddler	-	-				
Canada goose muscle onsite/ adult	-	0.139	0.069	0.148		
Canada goose muscle external reference/ adult	-	-				

* Appendix C of AEM's PQRA on the Meadowbank Mining project; **Toddler = 1-4 years**

⁺ values are for all foods. Based on lead occurrence data from the 2000-2002 Total Diet Study(TDS) combined with consumption data from the Canadian Community Health Survey (CCHS) cycle 2.2, 2004.
Toddler = 6 months-4 years, adult =12+

TDS: www.hc-sc.gc.ca/fn-an/surveill/total-diet/index-eng.php

CCHS: Statistics Canada 2004. Canadian Community Health Survey – Cycle 2.2 Nutrition. Detailed information for 2004 at: <http://www.statcan.gc.ca/cgibin/imdb/p2SV.pl?Function=getSurvey&SDDS=5049&lang=en&db=imdb&adm=8&dis=2>
CCHS general information: <http://www.hc-sc.gc.ca/fn-an/surveill/nutrition/commun/index-eng.php>

** Health Canada. (2012). Final Human Health State of the Science Report on Lead: <http://www.hc-sc.gc.ca/ewh-sem/pubs/contaminants/dhssrl-rpccscepsh/index-eng.php#a7> [accessed January 9, 2014].
Value represents the median dietary lead exposure for the Canadian population.

*** Chan, L, Receveur, O, Sharp, D, Schwartz, H, Ing, I and Tikhonov, C. (2011). First Nation Food, Nutrition & Environment Study (FNFNES): Results from British Columbia (2008/2009). Prince George, BC: University of Northern British Columbia, [accessed January 9, 2014]: http://www.fnfnes.ca/docs/BC%20Reports/FNFNES_Report_BC_FINAL_PRINT_v2.pdf.
Value represents average daily intake of lead from food and tap water for BC First Nations people living on reserve.