



MAR 24 2016

Dr. Gordon Edwards  
Canadian Coalition for Nuclear Responsibility  
53 Dufferin Street  
Hampstead QC H3X 2X8

Dear Dr. Edwards,

The following is in response to your February 22, 2016 critique of the CNSC's presentation to the Inter-Ministerial Committee on Uranium in Quebec, titled *Uranium in Quebec: Truth and Consequences* (enclosed).

We stand by our presentation made to the committee, where we were invited as technical experts. Our presentation is based on solid science, research and decades of regulatory experience.

Canada's long-standing experience in uranium mining, including the management of uranium tailings, has resulted in stringent regulations and world-leading practices for the protection of health and safety of persons and the environment. These practices have evolved over time to reflect changes in scientific knowledge, as have practices for other types of mining. All operating uranium mines in Canada conform to these modern requirements and the CNSC ensures strict compliance with these requirements.

By contrast, the data and assessment contained in your critique lack scientific rigor. The statements you make are built on outdated studies while the wealth of research available today on the health and environmental impacts of uranium mines and mills is largely ignored. There is sound and current evidence that workers and residents near these facilities are as healthy as the general Canadian population. In fact, in December 20, 2012, the CNSC provided you with an information package including decades of studies conducted by the CNSC on topics ranging from the health of workers and their children to the health of members of the public.

Enclosed in this letter, you will find a detailed technical response to your critique. I also enclosed the letter I have written to the Honourable David Heurtel, Minister of Sustainable Development, Environment and the Fight against Climate Change, dated July 27, 2015 (<http://www.nuclearsafety.gc.ca/eng/pdfs/letters/BAPE-letter-eng.pdf>), expressing our concern with the misinformation being circulated about uranium mining in Canada.

**70 years of nuclear safety in Canada / 70 ans de sûreté nucléaire au Canada**

We encourage you to visit our website [nuclearsafety.gc.ca](http://nuclearsafety.gc.ca) to get the facts about uranium mining, and to access the vast amount of health-related research published in peer-reviewed scientific journals.

Yours sincerely,



Michael Binder

Enclosures: (3)

c.c.: The Right Honourable Justin Trudeau, Prime Minister of Canada  
The Honourable Catherine McKenna, Minister of Environment and Climate Change (Canada)  
The Honourable Jim Carr, Minister of Natural Resources (Canada)  
The Honourable Philippe Couillard, Premier of Québec  
The Honourable Pierre Arcand, Minister of Energy and Natural Resources  
The Honourable David Heurtel, Minister of Sustainable Development, the Environment and the Fight Against Climate Change

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## CNSC Technical Response to Dr. Gordon Edwards' Critique Titled *Uranium in Quebec: Truth and Consequences*

March 23, 2016  
e-Doc: 4954146

Page, section	Subject	Dr. Edwards' critique	CNSC technical response
p.1, section 2	CNSC presentation (general)	<i>"The Inter-Ministerial Committee was established to assess the 2015 BAPE report and recommendations regarding uranium mining and milling in Quebec. Patsy Thompson attended the BAPE hearings and had ample opportunity to make the views of the CNSC clear. She was invited to offer rebuttal comments at the end of each day of BAPE testimony and took full advantage of that opportunity. In the context of all the evidence presented to the BAPE, the CNSC position did not prevail over other considerations. Now Patsy Thompson has been allowed to comment on the deliberations and conclusions of the BAPE panel in a session not open to the public. Is the inquiry still ongoing? The CNSC presentation would seem out of order even if it were reliable and accurate, which it is not."</i>	<p>The CNSC was invited as technical expert to present to the Interdepartmental Committee. The CNSC's presentation focused on the regulatory requirements for uranium mines and mills and is based on solid science, research, and decades of regulatory experience.</p> <p>Please note that Dr. Patsy Thompson was in fact not present during the 17 days of the BAPE public hearings held between September 3 and 25, 2014 and was present for only one day in the second phase of the hearing held between November 11 and December 15, 2014.</p>
p.1, section 3, 2nd sentence	CNSC presentation (general)	<i>"In its slide show presentation, however, CNSC fails to display even a minimal degree of objectivity on such matters, as it ignores or dismisses virtually all of the health and environmental hazards associated with uranium mining."</i>	At the request of the Interdepartmental Committee, the focus of the CNSC's presentation in January 2016 was to cover the regulatory requirements for uranium mines and mills and summarize CNSC's main comments on the BAPE report. The CNSC presented detailed information on the health considerations with respect to uranium mining during the BAPE public hearings in September 2014.
p.1, section 3, 3rd sentence	Health risks	<i>"...there is nothing in the slide show that provides even a basic scientific understanding of the unique risks that are associated with uranium mining. Only risks that are common to other kinds of mining are acknowledged."</i>	<p>Dr. Edwards' statement fails to consider that, as mentioned above, the focus of CNSC's presentation to the Interdepartmental Committee was to cover the regulatory requirements for uranium mines and mills and summarize CNSC's main comments on the BAPE report. The CNSC presented detailed information on the risks associated with uranium mining during the public hearings in September 2014.</p> <p>In fact, as an independent governmental regulatory body, the</p>

			<p>CNSC specializes in the regulation of health and environmental risks associated with the nuclear fuel cycle, including uranium mining and milling. The CNSC has developed a regulatory framework which specifically addresses the health and environmental hazards associated with uranium mining and milling. The hazards are not negligible. If they were, there would be no need for regulatory oversight by the CNSC. However, through proper regulation, the risks associated with these hazards are negligible, as has been demonstrated by the comprehensive worker protection and environmental monitoring programs required under the <i>Nuclear Safety and Control Act</i> (NSCA) and reported to the Commission and the public during licence hearings and annual performance reviews.</p> <p>For many of its aspects, the potential adverse health effects associated with uranium mining are no different than the risks identified in other types of non-radiation-related mining activities (Committee on Uranium Mining in Virginia et. al, 2011 and Laurence, 2011). Uranium mining, however, adds another dimension of risk because of the potential for exposure to elevated concentrations of radionuclides, particularly radon decay products (RDP). Internal exposure to radioactive materials during uranium mining and processing can take place through inhalation, ingestion, or absorption through an open cut or wound. External radiation exposure from beta particles or gamma rays can also present a health risk.</p> <p>The likelihood of negative health outcomes is related to the dose received. The CNSC closely monitors the implementation of radiation protection procedures and radiation doses received by workers. As a result of this regulatory oversight, doses to Saskatchewan uranium miners for 2013 were very low, and the average annual dose from all sources combined was 0.53 mSv in 2013, of which half was due to exposure to radon progeny (i.e., 0.05 WLM, which is equivalent to 0.25 mSv) (SAN9). These doses are too low to be able to distinguish lung cancer risk potentially due to mining from lung cancer risk due to radon exposure in Canadian dwellings. Risks to modern uranium miners in Canada are similar to the risk of the rest of the population.</p> <p><b>References:</b> Committee on Uranium Mining in Virginia; Committee on Earth Resources; National Research Council. Uranium Mining in Virginia: Scientific, Technical, Environmental, Human Health and Safety, and Regulatory Aspects of Uranium</p>
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p.1, section 4	Radioactive materials in uranium mine tailings	<p><i>"...the CNSC slide show makes no mention of the fact that the voluminous sand-like tailings from uranium milling contain 85 percent of the radioactivity that was present in the original ore. Why is this essential scientific fact not stated by the CNSC? The radioactive materials in uranium mill tailings – isotopes of radium, radon, polonium, and thorium, along with radioactive varieties of bismuth and lead – are all radioactive disintegration byproducts of uranium. Each one of them is far more radiotoxic than uranium – which is itself a dangerous material, being a radioactive heavy metal. Yet none of these byproducts is discussed or even mentioned by the CNSC."</i></p>	<p>The Interdepartmental Committee requested that the CNSC's presentation provide a review of how the hazards associated with uranium mining and milling documented in the BAPE report were regulated by the CNSC, and the risks these activities posed at a <u>modern</u> uranium mining or milling operation regulated under the <i>Nuclear Safety and Control Act</i>.</p> <p>The Interdepartmental Committee was already fully cognizant of the basic facts related to the presence of radionuclides within uranium mine tailings, as this information was presented within the BAPE's report.</p>
p.2, section 5, 3rd sentence	Radon decay products and lung cancer	<p><i>"Radon emitted from radioactive ore bodies is a proven cause of lung cancer in underground miners, particularly uranium miners. Yet the CNSC slide show does not mention radon as a hazard associated with uranium mining."</i></p>	<p>The CNSC presentation specifically addresses incidences of lung cancer in workers resulting from radiation exposure (i.e., radon) in slide 20. The Interdepartmental Committee was already fully cognizant of the presence and risks associated with radon gas in the absence of proper worker protection programs (SAN9, see reference below). Thus there was no need for the CNSC to elaborate further in this presentation.</p> <p>The CNSC recognizes that radon decay product (RDP) exposure was associated with lung cancer in the past when exposures were significant. Radon was identified to cause lung cancer by the International Agency for Research on Cancer (IARC) many decades ago. Epidemiological studies of uranium mine workers showing increased risk of lung cancer are the scientific basis for the current requirements for strong radiation protection measures in modern uranium mines. The strict enforcement of radiation protection requirements by the CNSC is the reason the levels of RDP exposure of modern miners (0.05 WLM in 2013) are almost 1,000 times lower than they were in the 1940s. This was presented and discussed during the BAPE public hearings (INFO 36, see reference below) and further described in the response</p>

			<p>below.</p> <p><b>References:</b>  SAN9. Canadian Nuclear Safety Commission. <i>Uranium Mine Workers' Exposure and Incurred Risk Since the Coming Into Force of the Nuclear Safety and Control Act (NSCA) in 2000</i>, August 2014, 24 pages.</p> <p>INFO 36. Canadian Nuclear Safety Commission. <i>Protecting the Health of Uranium Mine Workers: The Situation from the 1930s to the Present Day</i>, PowerPoint presentation, September 16, 2014, 25 pages.</p>
<p>p.2, section 6, 1st paragraph</p>	<p>Ontario Uranium Miners Cohort Study</p>	<p><i>“This study confirms what is known about underground uranium miners, which is that they have an increased risk of lung cancer.”</i></p>	<p>Dr. Edwards’ interpretation of the findings of the Ontario Uranium Miners Cohort Study is incomplete.</p> <p>There is sound and current evidence that risk of lung cancer to uranium miners is no higher than for the general Canadian population. For example, the report provides clear evidence that miners with RDP exposure between 1 and 10 WLM do not have an elevated risk of lung cancer (RR &lt; 1) and that modern miners (starting employment after 1970) with RDP exposures between 1 and 5 WLM did not have an elevated risk of lung cancer mortality.</p> <p>For many years, radon has indeed been recognized as a hazard to underground miners. When considering the entire cohort of this study dating back to before proper ventilation techniques were introduced (in the 1970s), the study found an increased number of deaths and incident cases due to lung cancer, as compared to the general Canadian male population. This is not new information and has been known for decades. However, when considering lung cancer mortality for modern miners who started working after 1970, their relative risk was lower in some exposure categories as compared to the whole cohort.</p> <p>Furthermore, based on the Cancer Care Ontario Report on the updated Ontario Uranium Miners’ (OUM) Cohort, the excess relative risks (ERR) for lung cancer incidence (1969–2005) and mortality (1954–2007) are respectively 0.63/100 WLM (95% CI: 0.42–0.84) and 0.64/100 WLM (95% CI: 0.42–0.86). This is lower than the ERR of 1.17/100 WLM (95%CI: 0.2–22.5) estimated by BEIR VI and of 0.89/100 WLM estimated in an earlier study for the same OUM cohort.</p> <p>A feasibility study conducted in 2003 using an ERR of 0.89/100 WLM predicted a single lung cancer mortality in 24,000 modern miners (1975–2030) using past and projected worker doses. Repeating this study using the measured doses from 2001 to</p>

			<p>2013 and the lowered ERR from the updated OUM would predict even fewer lung cancer mortalities (i.e., &lt;1 in 24,000 workers). In conclusion, while the OUM study does assign an excess relative risk to RDP exposure, the impact of that risk on health outcomes is so small, given the low exposure levels of modern miners, that lung cancer risks to current uranium miners are indistinguishable from the risks to the general Canadian population.</p> <p><b>Reference:</b> Ontario Uranium Miners Cohort Study Report. Prepared for The Canadian Nuclear Safety Commission, February 2015 by The Occupational Cancer Research Centre, Cancer Care Ontario, R280.4.</p>
<p>p.2, section 7, 1st paragraph</p>	<p>Toxicity of radionuclides</p>	<p><i>“The CNSC presentation states that radionuclides released into the environment by uranium mines and mills are not toxic. These radionuclides include radium, radon, and polonium.”</i></p>	<p>The statement on slide 10 refers to the fact that radionuclide releases from uranium mines and mills are not classified as “toxic” under the <i>Canadian Environmental Protection Act (CEPA)</i>. “Toxic” as defined in CEPA does not refer to the actual toxicity of the substance, but whether or not it is released into the environment at levels or under conditions that would result in harmful effects (see section 64 of CEPA).</p> <p>This slide clearly references the 2003 Environment Canada/Health Canada Priority Substance List 2 Assessment Report: “Releases of Radionuclides From Nuclear Facilities”. This assessment examined the release of radionuclides from nuclear facilities, including all aspects of the uranium fuel chain, from mining and milling through to power generation and waste management. The assessment concluded the following:</p> <p><i>“Based on available data concerning the effects from exposure to ionizing radiation, it has been concluded that ionizing radiation emitted by radionuclides released from uranium mines and mills, uranium refineries and conversion facilities, stand-alone waste management facilities, power reactors and their associated waste management facilities, and research reactors is not entering the environment in quantities or concentrations or under conditions that have or may have an immediate or long-term harmful effect on the environment or its biological diversity.”</i></p> <p>The report essentially concluded that, with respect to ionizing radiation, these nuclear substances were regulated in such a way that releases were not toxic as defined in CEPA.</p>

			<p>This conclusion continues to be supported by the results of the current monitoring programs at the uranium mines and mills. As presented in the public annual reports to the Commission and to the BAPE (NAT 24, see reference below), activity levels (i.e., concentrations) of Ra-226, Pb-210, Po-210 and Th-230 within undiluted treated effluents are below Canadian drinking water standards with surface waters being within the range of natural regional background. Atmospheric monitoring of these radionuclides indicates levels do not exceed dose reference screening levels (0.1 mSv per year) with a combined estimated dose of 0.051 mSv per year. Radon monitoring indicates a rapid decrease from source with dose due to radon and its progeny at an approximate distance of 2 km from the mines being similar to the regional natural background.</p> <p><b>Reference:</b> NAT 24. Canadian Nuclear Safety Commission. <i>Environmental Performance of a Uranium Mine or Mill Regulated Under the Nuclear Safety and Control Act</i>, October 2014, 232 pages.</p>
p.3, sections 7.1 and 7.2	Health effects of radium and radon	<p><i>“Radium is well known to be a highly toxic radioactive heavy metal.”</i></p> <p><i>“Radon is one of the most potent cancer-causing agents known to science.”</i></p>	<p>As previously mentioned, the toxicity of a substance is related to the level of exposure. It has been demonstrated by environmental monitoring that the levels of radium and radon in the environment surrounding uranium mines were maintained below levels that would be considered toxic (see response above).</p> <p>Furthermore, it should be noted that through robust epidemiological studies, the impacts of radium-226 are well known. Bone cancer only appears following exposures to radium-226 at doses above 10 Sv (INFO-0781). Radium-226 does not cause cancer below this very high threshold dose. No uranium mine/mill worker or member of the public would be exposed to doses of radium-226 even approaching the public dose limit of 1 mSv, which is orders of magnitude below the threshold dose of 10 Sv.</p> <p><b>Reference:</b> Canadian Nuclear Safety Commission, <i>Understanding health studies and risk assessments conducted in the Port Hope community from the 1950s to the present</i>, April 2009, INFO-0781.</p>
p.3, section 7.2, last paragraph	Radon in Canadian homes	<p><i>“In 2006 the Canadian standard for radon in homes was drastically reduced by a factor of 4: from 800 to 200 Bq/m<sup>3</sup>. Even this reduced radon level is far from harmless. It is surprising that the CNSC has never issued a public alert about these</i></p>	<p>The CNSC does not have any jurisdiction over radon in homes; the CNSC’s mandate is limited to radon and RDP exposure that are the result of uranium mining and the nuclear fuel cycle.</p> <p>The Health Canada (HC) guidelines for exposure to radon in</p>



		<p><i>health dangers.”</i></p>	<p>indoor air apply to exposures of members of the public to radon and its short-lived progeny as naturally occurring nuclear substances. Such exposures are exempt from the application of the NSCA. Specifically, section 10 of the <i>General Nuclear Safety and Control Regulations</i> states that:</p> <p><i>“Naturally occurring nuclear substances, other than those that are or have been associated with the development, production or use of nuclear energy, are exempt from the application of all provisions of the Act and the regulations made under the Act.”</i></p> <p>The HC guidelines for exposure to radon in indoor air recommend that remedial measures should be undertaken in a dwelling whenever the average annual radon concentration exceeds 200 Bq/m<sup>3</sup> in the normal occupancy area.</p> <p>While the CNSC does not have jurisdiction in this matter, the CNSC’s authority encompasses exposures of workers and members of the public to nuclear substances that are or have been associated with the development, production or use of nuclear energy, including exposures of the public resulting from CNSC-licensed activities. The data provided earlier demonstrates that radon (RDP) exposures in currently operating mines are well below the HC guidelines leading to worker exposures of approximately 0.25 mSv. Similarly, radon concentration ~ 2 km from the mines is similar to natural background which again is below the HC guidelines of 200 Bq/ m<sup>3</sup>.</p>
p.4, section 8	Long-term safety	<p><i>“The CNSC slide show states “Uranium mines and mills are regulated throughout their life cycle, and financial guarantees are in place to cover the decommissioning of such facilities and ensure their safety in the long term.” [p.24] CNSC does not explain that, for the radioactive contaminants in uranium tailings, the “long term” lasts thousands of years.</i></p> <p><i>The inventory of radionuclides in uranium tailings will not diminish significantly for the first 10 000 years, and will only be reduced by half after 76 000 years. This is a scientific principle that applies to all the radium, radon and polonium isotopes mentioned above, as well as radioactive varieties of thorium, bismuth and lead that are byproducts</i></p>	<p>Dr. Edward fails to mention that trace metals in conventional mill tailings are toxic forever (with no decay) and also require robust management in the long term.</p> <p>All tailings represent a hazard that needs to be managed responsibly over the long term. Benchmarking against requirements (decommissioning plans, financial guarantees) in place provincially for conventional mines and internationally for uranium mines demonstrates that the CNSC regulatory requirements represent best practices. As is presented on slides 14 and 15 of the CNSC presentation, long-term safety is ensured through a safety case and financial guarantees.</p>

		<p><i>of uranium...Who does CNSC suppose will “ensure safety for the long term?”</i></p>	
~p.4, section 9	Financial guarantees	<p><i>“Let’s compare the cost of the Port Hope cleanup with that of ensuring the long-term safety of uranium tailings. At Port Hope, the volume of radioactive wastes is 1.8 million cubic metres, and the estimated cleanup cost is 1800 million dollars. This averages out to \$1000 per cubic metre. In contrast, the financial guarantees for uranium tailings cited in the CNSC slide show only amount to about \$25 per cubic metre. It is unlikely that these funds will be enough to recover, decontaminate and clean up after uranium tailings are scattered.</i></p> <p><i>In addition to the tailings at the five facilities mentioned in the CNSC slide show, there are another 125 million cubic metres of uranium tailings at other locations in Canada. At the rate of \$25 per cubic metre, a contingency fund of about \$3100 million would be required. Using the more realistic figure of \$1000 per cubic metre, a contingency fund of \$125 000 million would be needed. No fund currently exists for these abandoned radioactive wastes.”</i></p>	<p>It is inappropriate to compare remediation costs for the community of Port Hope to those associated with the planned decommissioning of a modern uranium mine or mill. The costs at Port Hope involve the remediation in a populated centre which had low but spatially wide ranging contamination of public and private lands as a result of past historical practices considered completely unacceptable by today’s regulatory standards.</p> <p>A modern uranium mine or mill regulated under the NSCA is required to plan for cost-effective decommissioning as early as the environmental assessment stage. Should an operation receive a licence, it is required to operate with final decommissioning in mind and to revise their decommissioning plan and financial guarantee on a five-year cycle. This systematic approach promotes decommissioning in a responsible, cost-effective manner.</p>
p. 5, section 10	International safety standards for radiation	<p><i>“The CNSC slide show states “international safety standards for radiation have been applied in Canadian uranium mines for more than 40 years”. [p.20] While true, this is nothing to brag about. These international “safety” standards are quite unsafe – a fact that was known even 40 years ago, in 1976. Around that time a number of independent reports documented extensive damage to human health and the environment from uranium mining. What follows is a brief summary of three of these reports that are still pertinent today.”</i></p>	<p>The outdated 1976 reference used by Dr. Edwards is irrelevant in the context of the current CNSC regulatory framework.</p> <p>In the drafting of regulations and regulatory guidance, the CNSC takes into consideration relevant international benchmarks, operating experience, industry practices and lessons learned. The CNSC regulatory framework is reviewed on a routine basis to ensure that it remains up-to-date with evolving standards and takes account of new information. Numerous studies and reports provide extensive evidence that the environment and members of the public around CNSC-regulated facilities, including uranium mines and mills, are protected as are workers in these facilities (e.g., NAT24 and SAN9).</p> <p><b>References:</b>  NAT 24. Canadian Nuclear Safety Commission. <i>Environmental Performance of a Uranium Mine or Mill Regulated Under the Nuclear Safety and Control Act</i>, October 2014, 232 pages.</p>

			SAN9. Canadian Nuclear Safety Commission. <i>Uranium Mine Workers' Exposure and Incurred Risk Since the Coming Into Force of the Nuclear Safety and Control Act (NSCA) in 2000</i> , August 2014, 24 pages.
p.5, section 10.1, 1st paragraph	Ham Commission Report	<i>"In 1976, the Report of the Ontario Royal Commission on the Health and Safety of Workers in Mines -- known as the "Ham Commission" -- revealed that radiation exposure had more than tripled the mortality from lung cancer among Ontario uranium miners. "From a total of 41 lung cancer deaths observed in Ontario in a population of about 8000 miners in the years 1955-72, there was an excess of 28 over the 13 lung cancer deaths expected."</i>	<p>Dr. Edwards' statements are built on outdated studies while the wealth of research available today on the health and environmental impacts of uranium mines and mills is largely ignored. There is sound and current evidence that workers and residents near these facilities are as healthy as the general Canadian population.</p> <p>In fact, since 1976, updated studies for the Ontario Uranium Miners' cohort have been published, and the most recent published in 2015 conducted by Cancer Care Ontario updated the cohort data for cancer incidence and mortality up to 2007. The up-to-date report concludes that the excess relative risks (ERR) for lung cancer incidence (1969–2005) and mortality (1954–2007) are respectively 0.63/100 WLM (95% CI: 0.42-0.84) and 0.64/100 WLM (95% CI: 0.42-0.86). As a consequence of the reduction in exposures to radon and RDP for modern miners (e.g., 0.05 WLM/annum for 2013), the resulting lung cancer risks to uranium miners are indistinguishable from the risks to the general Canadian population.</p> <p><b>Reference:</b> Ontario Uranium Miners Cohort Study Report. Prepared for The Canadian Nuclear Safety Commission, February 2015 by The Occupational Cancer Research Centre, Cancer Care Ontario, R280.4.</p>
p.6, section 10.2, last paragraph	Radiation exposure for Canadian uranium workers	<i>"According to CNSC publication INFO-0813, the average 2006 radiation exposure for Canadian workers in underground uranium mines was only about one-third of a WLM per year. Over a 50-year working lifetime, on average, such underground miners would accumulate a dose of 17 WLM. According to the Thomas-McNeill Report that exposure could cause 22 extra lung cancers per 1000 men, increasing the toll from 55 to 77 lung cancer deaths per thousand. That's a 40 percent increase in the lung cancer rate. Such a death toll is not negligible."</i>	<p>Dr. Edwards' calculation of the number of cancer deaths is incorrect.</p> <p>A feasibility study conducted in 2003 using internationally endorsed models based on the best uranium mines epidemiological studies (BEIR VI) and an ERR of 0.89/100 WLM, predicted one (1) lung cancer mortality in 24,000 modern miners (1975–2030) using past and projected worker doses. Repeating this study using the measured doses from 2001 to 2013 and the lowered ERR from the updated OUM would predict even fewer lung cancer mortalities. In conclusion, while the OUM study does assign an excess relative risk to RDP exposure, the impact of that risk on health outcomes is so small, given the low exposure levels of modern miners, that current lung cancer risks to uranium miners are indistinguishable from the risks to the general Canadian population.</p>

<p>p.7, section 11</p>	<p>Biological effects</p>	<p><i>“The CNSC slide show states that harmful biological effects from uranium mines and mills “are not the result of radioactivity.” [p.10] In fact nowhere in the CNSC presentation is there any indication of any special dangers attributable to the radioactivity of the ore body. The CNSC message seems to be that uranium mining is much like other kinds of mining, and uranium mill tailings are much the same as tailings left over from other hardrock mining. If this were true, however, one would be hard-pressed to comprehend why uranium mines, unlike any other mines in Quebec, are placed under federal jurisdiction -- and in particular under the jurisdiction of the Canadian Nuclear Safety Commission.”</i></p>	<p>Dr. Edwards does not provide any modern scientific evidence – based either on peer-reviewed literature or robust credible risk assessments using the extensive monitoring data collected around currently operating uranium mines and mills – to support his claims.</p> <p>The answer lies in much of the history provided within Dr. Edwards’ critique. In the past, the nuclear regulator (the Atomic Energy Control Board) focused primarily on security issues related to nuclear materials with occupational health and safety and environmental issues perceived as more provincial concerns (Sims 1981). This was especially pronounced for uranium mines and mills as mining was, then and now, generally considered a provincial responsibility. Studies such as the Ham Commission and public hearings held by the Ontario Ministry of the Environment in the late 1970s on environmental contamination in the Elliot Lake region identified concerns about such a regulatory approach. The Ham Commission explicitly identified the lack of clarity as to judicial responsibility as a concern. Indeed, it was not until 1978, following the Ham Commission, that the definition of “nuclear facility” under the <i>Atomic Energy Control Act</i> was amended to include “uranium or thorium mine or mill” (Sims 1980).</p> <p>This history of potential jurisdictional confusion with respect to occupational risks and environmental regulatory responsibility was explicitly accounted for in the drafting of the replacement of the <i>Atomic Energy Control Act</i> with the <i>Nuclear Safety and Control Act</i> in 2000. Under the NSCA, radiation protection of workers and the public as well as environmental protection from both hazardous (i.e., chemical) and nuclear substances was clearly identified and emphasized as being the responsibility of the CNSC. To meet this clarified and expanded mandate, the CNSC expanded its technical and regulatory expertise and developed a rigorous health and environmental protection framework. Uranium mining and milling can be conducted responsibly using best practices with appropriate regulatory oversight,.</p> <p>Uranium mine tailings are managed within a more rigorous technical (e.g., engineered in-pit tailings management facilities) and regulatory framework than non-uranium tailings. When regulated in this manner uranium mining and milling can be conducted safely and responsibly.</p>
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p.7-8, section 11.1	Radionuclide releases from nuclear facilities	<p><i>“Compare the dismissive tone about radioactivity in the CNSC slide show with the following passage from a 2004 International Atomic Energy Agency (IAEA) document entitled “The long term stabilization of uranium mill tailings” (IAEA-TECDOC-1403)...”</i></p>	<p>The CNSC takes exception to Dr. Edwards’ statement that the CNSC is dismissive with respect to the risks from radioactivity associated with uranium mill tailings.</p> <p>Canada, through the CNSC, is a very active member state of the IAEA and is fully cognizant of the IAEA literature, including the document referenced by Dr. Edwards. The CNSC regulatory framework recognizes these radiological issues and manages them responsibly.</p> <p>The emphasis on radionuclides in IAEA documentation is in keeping with the IAEA’s mandate, which is restricted to nuclear materials. The CNSC’s mandate, however, includes both hazardous (i.e., chemical) and nuclear substances, and the CNSC has developed extensive experience regulating and managing both types of substances. The message being communicated in the CNSC presentation is that both hazardous and nuclear substances require responsible regulation; however, on a risk basis, many chemically toxic substances pose a greater risk than radionuclides and must also be appropriately regulated.</p> <p>The quote provided by Dr. Edwards from the IAEA document refers to work completed by Drs. G. Bird and P. Thompson of the CNSC presented at a 2002 IAEA conference on <i>The Protection of the Environment from Ionising Radiation: The Development and Application of a System of Radiation Protection for the Environment</i>. The quote refers to the draft conclusions (2002) of the CEPA toxic assessment of releases of radionuclides from nuclear facilities referred to in slide 10. After formal peer review</p>

			<p>and a public comment phase, the final report concluded that ionizing radiation emitted by radionuclides released from uranium mines and mills were not CEPA toxic. However, it was also concluded that uranium releases at one operating site were CEPA toxic based on its chemical toxicity.</p> <p>Following this assessment, Environment Canada determined that the recently promulgated NSCA (now containing hazardous substances) and its associated regulations, licences, licence conditions and public licensing process, were the most appropriate means of ensuring long-term risk management activities of uranium releases. This resulted in a series of regulatory actions under the NSCA requiring that uranium releases be an order of magnitude lower than those in relevant provincial regulations. Documentation on these activities is available on the <a href="#">CNSC's uranium annual reports Web page</a>.</p> <p>This is another example where the CNSC regulatory framework was best equipped to address an issue relative to other federal (e.g., <i>Metal Mining Effluent Regulations</i>) and provincial regulations (<i>Saskatchewan Mineral Industry Environmental Protection Regulations</i>).</p>
p.8, section 11.2	Risk of abandoned uranium mine tailings to human health	<p><i>"The CNSC slide show says "The tailings of abandoned mine sites represent only a negligible risk to human health, even when the site was used for traditional activities." One activity that is traditional and on-going is the construction of roads, homes and schools. The sand-like nature of radioactive mine tailings makes the material attractive for use in construction projects, either as fill around and under the foundations of a building or as a constituent of the cement or mortar used in construction. The radioactive nature of the material is not evident. However, the use of this material results in high levels of radon gas inside the buildings, thereby greatly increasing the risk of lung cancer for the residents. In addition, residents are constantly being exposed to gamma radiation (similar to x-rays but more powerful)."</i></p>	<p>Under the CNSC's existing regulatory framework, tailings management facilities are required to be appropriately decommissioned with appropriate financial guarantees. The scenario described by Dr. Edwards is not realistic today.</p> <p>Further, the CNSC provided extensive information to the BAPE on the number and location of abandoned tailings (QUES 6.3, see reference below). Information was also provided on the assessment conducted since the coming into force of the NSCA in 2000. Extensive reviews have shown that abandoned uranium tailings were not used in the manner hypothesized by Dr. Edwards. The one remaining site (Gunnar) is currently being remediated and will not represent an ongoing risk or a source of building materials.</p> <p><b>Reference:</b> QUES 6.3. Canadian Nuclear Safety Commission. Supplemental information to question 1A and response to question 2 of QUES6 document, May 30, 2014, 7 pages.</p>
p.9, section 11.2, last paragraph	Health effects of contamination in Port Hope	<p><i>"In 1976, St. Mary's elementary school in Port Hope, Ontario, had to be evacuated because of exceedingly high radon levels in the school"</i></p>	<p>Nuclear regulation has evolved significantly since 1976. The CNSC licenses, regulates and monitors Canada's waste management facilities to ensure they are operated safely.</p>

		<p><i>cafeteria emanating from radioactive fill used under the playground area.”</i></p>	<p>As with any other nuclear facility, the CNSC imposes rigorous reporting requirements on the operators of nuclear waste management facilities, and verifies that facilities comply with established safety requirements through inspections and audits.</p> <p>Canada’s historic low-level waste consists of soil contaminated with uranium and radium, the bulk of which is located in the Ontario communities of Port Hope and Clarington. This waste was originally managed in a way that is no longer considered acceptable.</p> <p>Despite these unacceptable historic practices, no adverse health effects have occurred or are likely to occur in Port Hope, as a result of the operations of the nuclear industry in the community. The CNSC conducted extensive research on the potential effect of uranium and radiation in Port Hope, Ontario because of the historical presence of the nuclear industry in the community. This conclusion is based on a report published by the CNSC in 2009 (INFO-0781) and a subsequent paper published in the peer review literature (Lane et al., 2011).</p> <p>The Government of Canada has accepted responsibility for the long-term management of this waste. A community-initiated environmental remediation, launched by the Government of Canada and local municipalities, is currently underway and will ensure the cleanup and safe long-term management of historic low-level waste within these municipalities.</p> <p><b>Reference:</b>  Canadian Nuclear Safety Commission, <i>Understanding health studies and risk assessments conducted in the Port Hope community from the 1950s to the present</i>, April 2009, INFO-0781.</p> <p>Lane, R., P. Thompson, M. Ilin, M. Phaneay, J. Burt, P. Reinhardt. 2011. <i>Use of a weight of evidence approach to determine the likelihood of adverse effects on human health from the presence of uranium facilities in Port Hope, Ontario</i>. J. Environ. Prot. 2:1149-1161.</p>
<p>p.9, section 11.3</p>	<p>Examples in Quebec of radioactive mine tailings management</p>		<p>Dr. Edwards provides a series of examples where provincial or state regulatory bodies responsible for the management of naturally occurring radionuclide materials (NORM) may have been managed inappropriately. In Canada, NORM in this form are not regulated by the CNSC, whose mandate is limited to the nuclear fuel cycle. Further, such practices are not occurring in and around facilities regulated by the CNSC. Therefore, Dr. Edwards’</p>

		<p>examples are irrelevant to judge the environmental performance of CNSC-regulated uranium mine tailings.</p>
<p>p.10, section 12</p>	<p>Matoush EA</p>	<p><i>“The CNSC slide show asserts that it is the “responsible authority” for environmental assessments that are “required for any proposed uranium mine or mill”. Nevertheless the CNSC accepted without criticism or comment a non-compliant EIS in 2009 related to the Matoush uranium project in the Cree territory of Eeyou-Istchee in Northern Quebec.</i></p> <p><i>The Guidelines that were laid down for the preparation of the Strateco EIS stated: “the impact statement must describe the radioactivity-related aspects that make this project different from other types of mining activities.” More specifically, the Guidelines make it clear that the proponent has an obligation to explain the fundamental facts and risks associated with radioactive materials in terms that are understandable to the population likely to be affected by the project. These requirements were not met by the EIS.”</i></p>
<p>The CNSC was a responsible authority for conducting the EA, but the environmental assessment (EA) decision for the project rested with the federal Minister of the Environment. The Minister determined that the federal EA conducted for the project met the requirements of the EA Guidelines and that the project, taking into account identified mitigation measures, is not likely to cause significant adverse environmental effects.</p> <p>Following extensive technical reviews and numerous requests to the proponent for additional information, CNSC staff were of the opinion that the Matoush uranium exploration project could be carried out safely, with the implementation of identified mitigation measures and the follow-up program. This was the recommendation the CNSC made to the Minister in the EA report.</p>		





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ccm 2015-000362

The Honourable David Heurtel, M.N.A.  
Minister of Sustainable Development,  
Environment and the Fight against Climate Change  
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Dear Minister,

The recently published Bureau d'audiences publiques sur l'environnement (BAPE) report compels me to write to you. It is very troubling to have the BAPE present your government with conclusions and recommendations that lack scientific basis and rigour. Furthermore, to suggest that uranium mining is unsafe is to imply that the Canadian Nuclear Safety Commission (CNSC) and the Government of Saskatchewan have been irresponsible in their approval and oversight of the uranium mines of Canada for the last 30 years.

The CNSC welcomed the Government of Quebec's decision to hold hearings to study the impacts of uranium exploration and mining in the province. Our experts fully participated in the BAPE's public process to inform and educate the BAPE on how we regulate the industry and ensure that the public, workers and the environment are protected. The BAPE's decision to continue to question the long-standing science and proven safe track record of modern uranium mining is misleading Quebecers and all Canadians.

It is our mandate to promote and enforce nuclear safety, and the CNSC takes exception to the BAPE's assertions that uranium mining is not safe.

At the BAPE's request, our staff – who are recognized internationally as scientific and regulatory experts – provided numerous submissions on how the CNSC oversees and monitors all aspects of a uranium operation to ensure safety, including environmental and radiation protection, worker health and safety, tailings and waste rock management, emergency preparedness and safe uranium transport. Our experts were available to the BAPE and appeared on the many days of hearings to support the panel's work. Solid, factual evidence was given on how Canadian nuclear activities are among the safest and most secure in the world due to stringent CNSC regulatory requirements.

We are also fully transparent in our regulatory oversight of uranium mines and mills, with a public hearing-based licensing process and annual reporting of operational safety and environmental performance. This represents a level of transparency and oversight practiced by no other industry in Canada.

While certain individuals or groups may have their diverse reasons to call for a permanent moratorium on uranium mining, their assertions regarding the health impacts on the public and environment are fundamentally flawed, as they ignore factual scientific research that has been conducted in these areas. We have carried out and validated several peer-reviewed studies over the past several decades. These studies have repeatedly provided sound evidence that workers and residents near these facilities are as healthy as the rest of the general population. The same is true of people who live near nuclear power plants.

The BAPE's report raised concerns that uranium is radioactive and that uranium tailings are dangerous for thousands of years. The reality is that every type of mining or industrial activity produces waste that needs to be effectively managed well into the future. All mines, including uranium mines, generate waste that contains both radiological and non-radiological contaminants of varying concentrations. All modern uranium tailings management facilities operating in Canada employ underground, in-pit tailings disposal that eliminates any risk of tailings dam accidents such as the one recently experienced at the Mount Polley copper and gold mine in British Columbia. Uranium mines have been the top environmental performers in the mining sector since the federal Metal Mining Effluent Regulations came into force in 2004.

We would never compromise safety by issuing a licence or allowing a uranium mine or mill to operate if it were not safe to do so. Furthermore, Canada is fully committed to international agreements on the peaceful use of nuclear energy to ensure that no uranium from Canada is used to produce nuclear weapons.

It is clear that the BAPE's recommendation not to proceed is based on the perceived lack of social acceptance and not on proven science. I would like to remind the Minister of CNSC's decision in 2013 involving a uranium project in northern Quebec (Strateco) where a panel of the Commission, which included a former BAPE president, determined that it was safe to proceed.

Minister, I understand that you will be reviewing the BAPE report's conclusions through an interdepartmental committee. I would like to offer CNSC experts once again to assist in that process, as the BAPE did not accurately synthesize and fully consider the information previously provided. As your government moves forward on this important matter, it must not ignore years of evidence-based scientific research on this industry. It is one of the most understood types of mining in Canada and has been safely undertaken in Saskatchewan for over 30 years.

Yours sincerely,



Michael Binder

c.c.: Pierre Baril, President of the BAPE