

## **Radon Standards should not be portrayed as “safe levels”**

Canada’s regulatory standards for radon exposure, both for workers (in uranium mines) and for the public (in homes), are neither safe, nor are they as low as reasonably achievable. In fact they pose a significant risk of lung cancer for those so exposed.

### **(1) Previous standard for radon in homes: 800 Bq/m<sup>3</sup> (becquerels per cubic metre)**

As noted in the 1998 publication “Le Radon à Oka”, people living in radon-contaminated homes and exposed at Health Canada’s permissible level of exposure over an extended period of time would experience a tripling of lung cancer rates. For smokers, the lifetime rate would go from 50 to 150 lung cancers for every 1000 people chronically exposed at that level of radon. For non-smokers, the rate would go from 5 to 15 lung cancers per 1000.

Since that time, under pressure from provincial health authorities, Health Canada’s permissible level of exposure to radon in homes was reduced fourfold in 2007.

The fact that the Canadian government would regard the previous standard as “acceptable” for so many years is an indictment of the degraded “safety culture” at the federal level when it comes to public exposures to atomic radiation.

### **(2) Current standard for radon in homes: 200 Bq/m<sup>3</sup>.**

Reducing radon exposure fourfold will reduce the number of radon-caused lung cancers fourfold. So for people chronically exposed at the new permissible level of radon in homes, there would be a 50 percent increase in lung cancers. For smokers, the rate would go from 50 to 75 lung cancers per 1000, and for non-smokers the rate would go from 5 to 7.5 lung cancers per 1000.

Altogether, the lung cancer rate in society would go from 55 per 1000 to 82.5 per 1000, if people were chronically exposed at the current permissible level of 200 Bq/m<sup>3</sup>.

This standard is far from safe, and it is far from acceptable – especially for new homes. The WHO, in recommending a limit of 100 Bq/m<sup>3</sup> for ALL homes in 2009, made a special plea for new homes – saying that all countries should be “implementing radon prevention in building codes to reduce radon levels in homes under construction”

### **(3) Thirty Years of Inaction – The Evidence Was There in 1978**

The current federal standard for radon in homes is twice as high as that now recommended by the World Health Organization. Before 2007 the federal standard was four times higher than that. Yet the government knew 36 years ago that chronic exposure to even the present permissible levels of radon gas in homes would cause a major increase in lung cancer rates.

In 1978, I testified at the Ontario Environmental Hearings on the proposed radon standards for new housing projects in Elliot Lake. The Ontario Ministry of Housing was at that time proposing an “acceptable” level of radon in entire subdivisions of brand-new homes being built. This level was about 25 percent LESS than the current federal standard.

## *BAPE Has Not Received Accurate Information re Health Risks of Radon Exposures*

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Using mortality figures provided by the Ministry, I demonstrated to the panel that if people were chronically exposed at the proposed radon standard, one would expect to see at least a 31 percent increase in lung cancer – that’s about 17 extra lung cancers per 1000. So instead of 55 lung cancers per 1000 (smokers and non-smokers combined), one would see 72 lung cancers per 1000. To me, this did not seem an acceptable standard for brand new homes.

A summary of my testimony can be found at [http://ccnr.org/lung\\_cancers.html](http://ccnr.org/lung_cancers.html) . The Panel accepted my analysis and recommended a totally independent review of the proposed radon standard for homes. However, no such independent reassessment ever took place.

The Atomic Energy Control Board (AECB) maintained that there would be no risk associated with the radon limits proposed by the Ministry of Housing. Indeed, that same limit had earlier been promulgated by the AECB as the clean-up criterion for homes in Port Hope Ontario that had been contaminated with radioactive wastes from the Eldorado uranium refinery.

During the 1980 Royal Commission of Inquiry into Uranium Mining in British Columbia, the BC Medical Association (BCMA) was shocked by the disconnect between alarming medical data on the one hand and unfounded reassurances from the regulatory agency on the other hand. They called the AECB an agency that is “Unfit to Regulate”. See <http://ccnr.org/bcma.html> .

“The present average allowable exposure to the public [to radon in homes] could result in 200-300 extra cases of lung cancer per 10,000 people per lifetime. In light of current knowledge, this might be considered tantamount to allowing an industrially induced and publicly sanctioned epidemic of cancer.”

“That the AECB consistently and seriously neglected its statutory responsibility for the regulation of uranium mines is obvious to the most casual observer.”

*from the BCMA Report, “Summary of Major Points”*

The BCMA concluded that the proposed standard for radon in Elliot Lake homes would result in 20-30 additional lung cancer deaths per 1000, rather than the 17 per 1000 that I had calculated.

### **(4) The Thomas/McNeill Report, Commissioned by the AECB**

Stung by the BCMA’s public criticism, AECB commissioned an independent review of the health effects of radon, radium, and other alpha-emitting materials. They hired a McGill epidemiologist, Duncan C. Thomas, and a physicist from the University of Toronto, K.G. McNeill, and told them to use only raw data from studies of exposed populations to arrive at the best scientific estimates of cancers caused by radon, radium, and other alpha-emitting materials.

The Thomas/McNeill Report, entitled “Risk Estimates for the Health Effects of Alpha Radiation”, was published by the AECB in 1982 as INFO-0081. They concluded that the proposed radon standard for Elliot Lake homes could increase the lifetime lung cancer risk by about 40 percent – 22 extra lung cancers per 1000. See [http://ccnr.org/thomas\\_report.html](http://ccnr.org/thomas_report.html) .

The Thomas/McNeill Report also found that if uranium miners were to work at the regulatory limit for 11 years, the number of lung cancer deaths in that group of people would double. “Our best estimate of the effect of a 50-year occupational exposure [at the maximum permissible levels] is 130 excess lung cancer deaths per 1000 . . . with a range from 60 to 250 per 1000.”

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If workers were to average only 1/10 of that limit in their radon exposures, then the number of excess lung cancers would also be reduced by a factor 10. Still, the Thomas/McNeill “best estimate” would yield an increase of 13 lung cancers per 1000 miners so exposed, and their most pessimistic estimate would give 45 extra lung cancers per 1000.

### **(5) Estimated radon-induced lung cancer deaths among uranium miners today**

The CNSC has testified that under modern working conditions in the Canadian context, the radon exposures of uranium miners are so low that no “discernible” lung cancers would occur.

The CCNR agrees that if CNSC refuses to gather health statistics on the exposed miners, or fails to update those records for many decades to come, then the excess lung cancers that will occur among these workers will surely not be discernible. This protects the industry, but it does not protect the miners who are likely to experience at least 10 to 20 radon-induced lung cancers per 1000 workers during a 50-year working lifetime. The toll may in fact be much higher.

According to CNSC publication INFO-0813, the average 2006 radiation exposure for Canadian workers in underground uranium mines was 1.74 millisieverts (mSv). If this annual exposure rate were to persist for 50 years, the cumulative average exposure for underground uranium miners would be  $1.74 \times 50 = 87$  mSv during a 50-year working lifetime.

According to the finding of the Thomas/McNeill Report that level of radon exposure would cause a 40 percent increase in lung cancer incidence (77 per 1000 as opposed to 55 per 1000).

### **Conclusion**

Canadian authorities have consistently misled Canadians – including uranium workers, members of the public, decision-makers and their official advisors – about the extent of the dangers of radon as well as other alpha emitting radioactive materials. In particular, existing standards of radon exposure in homes as well as existing levels of radon exposures in uranium mines pose serious health risks to those exposed for their working lifetimes.

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#### **NOTE TO READER:**

The full text of this document can be found at [http://ccnr.org/radon\\_standards.pdf](http://ccnr.org/radon_standards.pdf).

This is a supplementary submission to the Bureau d’ausienges publiques sur l’environnement in connection with the Generic Environmental Assessment of Uranium Mining currently underway in the province of Quebec. Previous submissions from Gordon Edwards and the CCNR are:

[http://ccnr.org/CCNR\\_BAPE\\_2014.pdf](http://ccnr.org/CCNR_BAPE_2014.pdf)

[http://ccnr.org/Uranium\\_GE\\_BAPE\\_rev3.pdf](http://ccnr.org/Uranium_GE_BAPE_rev3.pdf).

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