

Health concerns of nuclear power

The following is part eight of an eight part written debate regarding nuclear power generation

Published in the March 10, 2010 edition of the Mile Zero News and Banner Post

The Debaters

Dr. Jeremy Whitlock is the Manager of Non-Proliferation and Safeguards at Atomic Energy of Canada Limited (AECL), with responsibility for ensuring that reactor design at AECL meets international obligations on nuclear weapons non-proliferation. He is a second-generation employee of AECL Chalk River Laboratories, most of the time since the mid-90s as a reactor physicist working on research reactor development.

Dr. Whitlock received a B.Sc. (Physics) from the University of Waterloo in 1988, a M.Eng. (Engineering Physics – Nuclear) from McMaster University in 1991, and a PhD (Engineering Physics - Nuclear) from McMaster in 1995.

Adele Boucher Rymhs lives within the Grimshaw Gravels Aquifer and became involved in the nuclear issue when Lac Cardinal was proposed as the site for a nuclear plant. She is a retired teacher, serving as Secretary for Citizens Against Nuclear Development (CAND), a group of local residents concerned about the risks of contamination of their water.

Adele is President of the Coalition for Nuclear Free Alberta (CNFA), which is a member of the Alberta Environmental Network. The Coalition is composed of several grassroots organizations across the province - its mandate is to inform the public about the risks of nuclear power, and promote truly green renewable sources of energy.

Jeremy Whitlock - Opening Statement

Nuclear power has significant health effects, and they are positive. This debate has covered the potentially negative health effects, namely from radioactive emissions and accidents. The potential is significant, which is why most of the cost of nuclear energy development has been invested in safety and protection systems that make the risk negligible.

In the case of radioactive emissions, there is no known effect after numerous studies, mainly because (a) radiation is the most easily detected and isolated agent in our environment, and (b) the radiation levels are typically negligible compared to the natural environment.

In the case of accidents, there has been one with significant health effects - the Chernobyl disaster of 1986 which killed 31 workers. As tragic as Chernobyl was, the rarity of this

type of event makes the nuclear industry one of the safest human endeavours on the planet.

What about positive health effects?

Every year, nuclear electricity in Canada avoids over half a million tonnes of air pollution from fossil fuels, along with over 70 million tonnes of carbon dioxide. This has saved thousands of deaths, and improved the lives of millions more.

The provision of reliable, competitively-priced electricity from nuclear power has allowed Ontario's industrial sector to flourish since the 1960s, maintaining a high standard of living with its associated societal health benefits. Other countries, like China, seek a similar standard of living, and the only way to achieve this on a large scale is currently through significant use of nuclear power.

Nuclear medicine and cancer therapy, pioneered in Canada as a direct consequence of the nuclear industry, improve the lives of millions around the world each year. This is possibly the most tangible health effect of nuclear technology, as every one of us knows someone who has benefited from the healing powers of the atom.

Adele Boucher Rymhs - Opening Statement

“Health should be considered a state of physical, mental, social and *ecological* well-being” says the Canadian Association of Physicians for the Environment, part of the 100,000 member International Society of Doctors for Environment (ISDE) in 40 countries that called on governments around the world “to desist from construction of new nuclear power facilities”.

The ISDE further stated that “all existing plants should be decommissioned at the end of their natural life, and refurbishment or upgrading should be prohibited.”

Their rationale: radioactive waste, limited supply of uranium, no long-term waste disposal, carbon intensive mining and refining processes, economics, shorter life expectancy than predicted, leaks of radioactive substances into air and water, and marginal reduction in greenhouse gas emissions.

The Biological Effects of Ionizing Radiation (BEIR) VII Report from the US Academy of Sciences has reconfirmed “There is NO safe level of exposure to radiation”. Yet the nuclear industry denies this and continues to irresponsibly contaminate the atmosphere with emissions of carcinogenic substances, primarily tritium which is known to cause cancers, genetic damage, and abnormalities in fetuses. (www.tapcanada.org)

In Canada, the permissible level for tritium has conveniently been set higher than Europe or the United States, to accommodate nuclear plants which routinely emit large amounts of tritium. Scientists who operate CANDU reactors still won't admit there is a serious problem with the design.

Tritium cannot be filtered from ordinary water, so when tritium-contaminated water molecules evaporate, water vapour in the air is also radioactive. Every organic molecule can pick up this radioactive hydrogen.

The nuclear plant proposed for the Peace Country could release over 300,000 cubic meters of water vapour per day, which will travel wherever the wind takes it, and where it lands is where tritium will enter the food chain, and be consumed by humans.

Jeremy Whitlock - First Rebuttal

It is a fact that there is no known effect from low-level radiation (i.e. up to hundreds of times the natural background exposure). Nevertheless, a conservative assumption of “no safe level” is used by regulatory bodies in their safety principles. Rather than denying this assumption, the nuclear industry embraces it, and invests enormous sums in public safety because of it.

Tritium is treated no differently than other radioactive material in Canada, for which maximum public exposure is set at about 1/30 of background exposure. Tritium’s apparently high drinking water limit (7000 Bq/L) is simply due to its relatively benign nature. Even at this maximum level, a person would have to consume 20-30 tonnes of contaminated water annually just to match her normal background exposure.

Some other jurisdictions have lower levels; some have higher (e.g. the World Health Organization’s recommended limit is 10,000 Bq/L; Finland uses 80,000 Bq/L). It doesn’t matter since none come close to being dangerous, and actual releases from Canadian reactors comply with even the lowest international limits anyway.

If the nuclear industry is acting irresponsibly, then what about farmers who release thousands of times more radioactivity in the fertilizer they spread, and the milk they sell. The largest emission of radioactivity into the environment in the Peace River area will likely always come from agriculture. A reactor would lose its licence if it emitted similar levels.

In light of the millions of lives that nuclear power benefits, it is clear that any significant health effect is a positive one.

Adele Boucher Rymhs - First Rebuttal

Canada previously led the world in production of medical isotopes but the Chalk River nuclear facility is now outdated and contaminates the Ottawa River. Atomic Energy of Canada Limited (AECL) has failed in building the MAPLES replacement reactor after 15 years, at a cost of over \$500 million, and a \$1.6 billion lawsuit for failure to supply isotopes.

With new techniques to produce medical isotopes with particle accelerators and cyclotrons, Chalk River can be shut down, and AECL should also be retired. If they can’t

get a 10 megawatt research reactor to work safely, how can Canadians trust them to build a first-of-its-kind 1000 megawatt nuclear power reactor that won't emit tritium? And if Dr. Whitlock claims tritium levels don't matter, does he support lowering our present standard from 7000 to 20 Becquerels per litre?

Internationally, medical professionals believe nuclear activities already cause serious health problems. Since 1945, atomic bombs and over 2000 nuclear tests conducted above ground, underground, and underwater have dumped megatons of radioisotopes into the atmosphere, water and soil worldwide, and these will last for thousands of years.

Fallout from Chernobyl still affects neighboring countries. Only a few may have been killed at the time but more have died since and thousands suffer from thyroid cancer, leukemia, and birth defects. (www.chernobyl.info/index.php)

Add routine emissions from 439 existing nuclear plants, and our "normal" background level of radiation has become a major ecological health concern to mankind. More nuclear plants will greatly jeopardize the health of future generations.

Jeremy Whitlock - Second Rebuttal

We have already established that there is no known health effect from background radiation exposure (and hundreds of times higher). The characterization of low-level radiation as a "major ecological health concern to mankind" is an unsupportable allegation, and unhelpful to the discussion.

Likewise, the topic of nuclear weapons is irrelevant here.

Chernobyl was an unforgivable act of state-sponsored negligence, but exaggerating its effects is exploitation of others' suffering. There was an impact (most notably an increase in thyroid cancer), and the most un-biased findings can be found in the UN-sponsored report at www.iaea.org/Publications/Booklets/Chernobyl/chernobyl.pdf.

More to the point, the rarity of Chernobyl, and its impossibility in Western-designed reactors, are testaments to the industry's safety. Popular perception might differ, but rational decisions must be based upon facts. (Quick bias test: name the Russian hydroelectric station that killed twice as many workers as Chernobyl in August 2009.)

I most definitely do not support an unwarranted reduction of tritium's drinking-water limit to 20 Bq/L. The milk in your fridge contains 50 Bq/L of radioactivity. Perhaps we should lower speed limits to 1 km/h, to appease anti-automobile activists.

Moreover, since tritium's dose limit is equivalent to every other radionuclide's, one should then logically lower those too - which, as pointed out, might cause a few issues with the farmers. You'd probably have to outlaw marriage as well, since spousal radioactivity would likely be non-compliant.

The priority accorded to safe nuclear operation is as high as its health impact is low. This is not a coincidence.

Adele Boucher Rymhs - Second Rebuttal

The Ontario Drinking Water Advisory Council accepts the fact that there is NO safe level of radiation, as does the Toronto City Council, and both conclude that current permissible levels of radioactive tritium in Ontario are 350 times too high.

(www.odwac.gov.on.ca/reports/052109_ODWAC_Tritium_Report.pdf)

About 5.5 million people in the Greater Toronto Area get their drinking water from Lake Ontario. With a combined total of 12 reactors at the Darlington and Pickering nuclear sites, the lake has levels of tritium 2-5 times higher than those Great Lakes with no CANDU nuclear plants.

Monitoring of the Ottawa River over a five-year period has shown that communities downstream from the Chalk River plant have an increased level of tritium in municipal drinking water, reaching the highest levels after there have been “controlled releases” or times that tritium in the form of water vapour has been “vented” into the atmosphere.

The nuclear industry considers that the “solution” to “pollution” is “dilution” – all of which accumulates over time. The tritium problem was recognized from the outset – the employee town of Blind River was built far enough upwind and upriver of the Chalk River research reactors to avoid radioactive fallout.

The fact that insurance underwriters across Canada will not include homeowners’ coverage for nuclear liability tells the true picture. Unlike the US, nuclear companies in Canada do not provide automatic compensation payout to workers who develop cancer.

We are what we eat, drink, and breathe . . . radioactive contamination in any of these sources will affect our health.