

Tritium Emissions – Seeing Through Shuck

Radioactive emissions and background radiation

by Gordon Edwards, Ph.D., Canadian Coalition for Nuclear Responsibility

http://ccnr.org/shuck_blog_12_09_12.pdf

Dr. Gilles W. Grenier is the Director of Public Health for the region of Quebec that includes the Gentilly-2 nuclear power reactor.

In reaction to a powerful documentary film entitled "Gentilly Or Not To Be?" that raises questions about the possible health effects of human exposure to tritium from the Gentilly-2 reactor -- specifically an increased incidence of cancer and leukemia -- Dr. Grenier has been unequivocal in defending the plant.

He has been adamant in saying that radioactive emissions from the reactor are entirely safe and pose no health risk whatsoever to the population. He is also fond of repeating that the radioactive emissions from Gentilly-2 represent less than one percent of natural background radiation, implying that this makes it harmless.

I do not believe these statements of Dr. Grenier's are justifiable.

Some thoughts on this matter:

First -- Natural background radiation is not harmless. Radon gas alone -- a naturally occurring radioactive material -- is responsible for killing between twenty and thirty thousand Americans every year, according to the US Environmental Protection Agency. If the amount of radon gas were to be increased by even one percent, that would mean an extra 200 to 300 deaths per year. Is such an increase to be considered harmless?

Second -- Dr. Grenier's Department has no independent way of verifying the emissions from Gentilly-2 or of translating those emissions into radiation doses to people -- particularly in the case of developing foetuses. So presumably he is simply repeating numbers that have been given to him by engineers in Hydro-Quebec or CNSC. This is not his job. He does not work for HQ.

Dr. Grenier is a medical specialist whose job is to protect public health, not to defend any industry. So why is he sounding like a spokesman for the industry, quoting their numbers as if they come directly from God? Why doesn't he stick to his field of expertise and his field of responsibility, which is health? And why did he tell the film makers that there was no difference in cancer rates near G-2 when his own Department has publications that tell a different story? During the period 2000-2004, there was apparently a 27 percent increase in cancer and

leukemia among people under 20 years of age in that region compared with the rest of Quebec.

Third -- Of the hundred or so radioactive species ("radionuclides") released routinely by Hydro Quebec into the air and water around the Gentilly-2 reactor, [see http://www.ccnr.org/G-2_emissions.pdf] less than a handful exist in nature at all. Thus the natural background radiation is completely irrelevant to 98 % of the pollutants from nuclear power reactors. For example, radioactive cesium does not exist in nature. Neither does radioactive iodine, strontium, plutonium, etc. These radioactive materials are man-made -- they come only from nuclear weapons or nuclear reactors. Comparing such man-made pollutants with completely different materials that contribute to natural background radiation is more in the nature of public relations obfuscation than legitimate scientific information.

As a particular case, the natural background level of iodine-131 is ZERO. Indeed there is NO naturally occurring radioactive material that concentrates in the thyroid gland. Now, Hydro-Quebec has distributed iodine pills to the population around G-2 in order to partially counteract the harmful effects of iodine-131 in the case of a major release of this material. Instead of repeating industry assurances, Dr. Grenier would be performing a public service by documenting the harmful medical effects that can result (especially in the case of embryos and nursing infants) in case of an untreated exposure to radioactive iodine. Has Dr. Grenier's Department performed this public service? or is the DSP just reiterating calculated engineering numbers given by HQ rather than providing good independent medical information to the public?

Fourth -- Every radionuclide has its own unique pathway through the environment and through the human body, you cannot equate them. Iodine-131 damages the thyroid gland; radon attacks the lung; plutonium lodges in the bone; tritium goes everywhere in the human body and becomes incorporated directly into organic molecules, which is not the case with most other radioactive materials. Does Dr. Grenier know of any radionuclide that has easier access to the foetus than radioactive tritium does? Does Dr. Grenier know of any method pregnant women can use to filter radioactive tritium out of their drinking water in order to protect their unborn baby from unnecessary additional prenatal exposures to this radioactive pollutant? If so, let's hear about it.

Fifth -- Tritium is radioactive hydrogen. It is created in very large amounts in Canadian reactors because of the use of "heavy water" by these reactors. Each CANDU reactor releases about one trillion becquerels of tritium per day into the environment. That's about 365,000,000,000,000 becquerels per year. A becquerel is a unit of radioactivity, indicating that one radioactive disintegration is taking place every second.) Apparently, Dr. Grenier's Department finds this situation entirely acceptable and believes it is of no concern to public health. It

would be reassuring to know from which medical authority they have received this advice.

Sixth -- Tritium does exist in nature at very low concentrations. But the Ontario Drinking Water Advisory Council (ODWAC) says that anything above 2 becquerels per litre of tritium in drinking water is due to man-made pollution from nuclear weapons or from nuclear reactors. http://www.ccnr.org/GE_ODWAC_2009_e.pdf

So if tritium levels in the drinking water near the G-2 plant are about 15 becquerels per litres (according to BAPE = Bureau des audiences publiques sur l'environnement, the Quebec Agency for holding Public Hearings on the Environment) those levels are more than 650% greater than background levels of tritium. This is not 1% higher than background, this is 650% higher than background.

Meanwhile, the Canadian (and Quebec) standard for tritium in drinking water is 7000 becquerels per litre. That is 3 500 times higher than background. In other words, 350 000 % higher than background. Why does Dr. Grenier's Department not use such comparisons in their efforts to educate people to the facts?

Seventh -- Has Dr. Grenier read the toxicological advice of two independent scientific advisory bodies in Ontario that have recommended reducing the permissible level of tritium in drinking water by a factor of 350, down to 20 becquerels per litre maximum? If not, why not? Does Dr. Grenier not wish to follow or to endorse the best toxicological advice that is available?

Eighth -- Has Dr. Grenier studied the literature on carcinogenic, mutagenic and teratogenic effects of tritium exposure in laboratory animals? See http://ccnr.org/tritium_1.html . No other radioactive materials have been studied more extensively than tritium and plutonium, and it has been shown that tritium crosses the placenta and enters the body of a developing foetus quite readily and that tritium damages both chromosomes and genes.

Is Dr. Grenier aware that for more than 40 years, researchers have been quite united in saying that the biological harm caused by tritium is at least 3 times greater than the harm caused by a corresponding amount of gamma ray energy or x-ray energy? Yet the Canadian authorities continue to "calculate" tritium exposures without using this extra factor of 3 in their calculations. In terms of health protection, how does Dr. Grenier's Department justify this?

Ninth -- Has Dr. Grenier studied the report of the UK CERRIE committee, (Committee Evaluating Radiation Risks from Internal Emitters), which concludes that the biological harm caused by a given tritium exposure could be as much as 15 times greater than the harm caused by a corresponding quantity of gamma or

x-ray energy? See http://ccnr.org/Paper_9-01.pdf . Why is this study not reported in the literature provided to the public by Dr. Grenier's Department?

Tenth -- Is Dr. Grenier aware that a sudden intake of tritium can have a disproportionate effect on the subsequent life of a developing foetus? According to testimony given years ago by Dr. Edward Radford, Chairman of the National Academy of Sciences' BEIR (Biological Effects of Ionizing Radiation) Committee:

"What if a woman is in the early stages of pregnancy and the child is a girl -- 50 percent chance? That woman is going to be laying down her ova in the uterus at the time that slug of tritium comes in. Now the DNA of the ova will be labeled with the level of concentration of tritium that is appropriate at that time, within a day or two or three, rather than averaged over a longer time. As far as we know that tritium that is laid down in the DNA of the ova of that developing girl will remain for her whole reproductive lifespan. There is no exchange of that type of hydrogen. It is a very different kind of hydrogen as far as the body is concerned. Most of the [other] hydrogen in our body exchanges readily with tritium."
http://www.ccnr.org/tritium_2.html#radf

In recent years, the UK's official NDAWG (National Dose Assessment Working Group) has stated

"...doses from the assessment of a single realistic short-term release are a factor of about 20 greater than doses from the continuous release assessment."

An older German study (Hinrichsen, 2001) indicated such doses could be a factor of 100 greater.

Food for thought, perhaps.

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