

## Comments on NWMO Discussion Document 2: Understanding the Choices

By J. M. Cuttler, 2004 Nov. 18

None of the NWMO discussion documents contain the essential information the public should have in order to judge the acceptability of the choices that the NWMO has identified. As the NWMO has determined, people want to take responsibility for managing the nuclear waste generated in meeting energy demand. To do this, they require accurate information about the nuclear hazard and its how it compares with the natural radioactivity in our environment, to which all living organisms have adapted. The NWMO has not provided this information, which is key to public acceptance of nuclear power and selection of the waste management option.

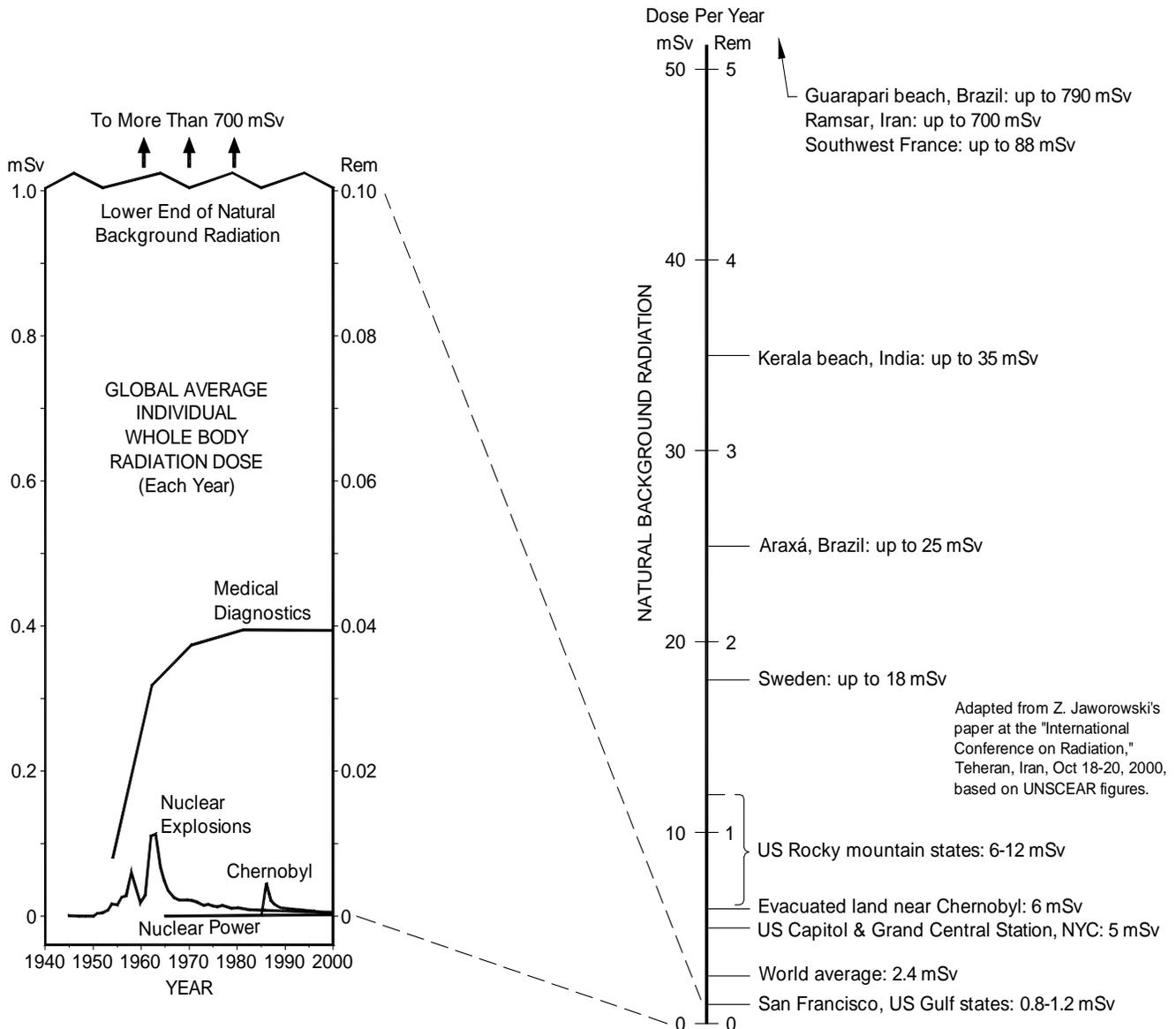


Figure 1. Comparing average annual dose: natural versus human-made radiation<sup>[1]</sup>

Figure 1 puts human-made radiation in perspective with the radiation that occurs in nature. From the time that life began, organisms have been exposed to natural radiation, whose intensity has been decreasing with time very slowly – over billions of years! Much of this natural radiation originates from uranium, thorium, potassium, rubidium, etc. Exposures to human-made radiation are comparatively very small. Figure 1 should be shared with the public.

Used nuclear fuel, in a ceramic form, has been put in sealed containers that can remain intact for thousands of years. Over a period of hundreds of years, the hazard from used fuel will greatly diminish. Potential radiation exposures will be smaller than exposures from natural substances. So we have the choice of leaving the used fuel on the surface, where natural radioactive substances already exist, or spending considerable money to put it underground, where it would be much more expensive to recover.

It is very important for the NWMO to inform the public that only one percent of the uranium in the used fuel has been fissioned (to produce energy). The technology already exists to fission the remaining 99% in advanced nuclear reactors, but it is not economic to do so at the present time. The economics of recycling the used fuel will become favourable in the near future.

The public is concerned about the reliable supply of affordable, non-polluting energy. To meet the growing needs, great efforts are underway to locate and extract more supplies of oil and gas, on land and on the ocean floor. Renewable sources are being exploited. Energy costs are increasing and will continue to increase.

The NWMO ought to inform the public that nuclear fission is an affordable and very sustainable source of energy. After the high concentrations of uranium ore are used up, Canadians will build advanced reactors and recycle the used fuel they have stored. The fission products – the real waste – will be solidified and isolated using technology already available. At that time, Canadians will be more knowledgeable about radioactivity, and there will likely be fewer social concerns about fission product disposal options.

As the used fuel is consumed, Canadians will begin to extract uranium dissolved in the oceans and fission it completely in their advanced reactors. This source of uranium fuel is affordable and sustainable because the rivers continually bring more uranium to the oceans, maintaining the concentration.<sup>[2]</sup>

When the public receives the above information, it will realize that:

1. Nuclear energy is a very safe option. If people are concerned about exposures to radiation, natural sources provide much more exposure than nuclear power sources.
2. Used fuel is not waste; it is an enormous and very valuable source of energy for future generations of Canadians.
3. Current methods of used fuel storage are adequate to allow convenient recovery and recycle in advanced nuclear reactors when the high concentrations of uranium ore are mined and used up.
4. Fission products are the real waste. They can be solidified and isolated, after the fuel is recycled, using technologies already available.
5. Energy from nuclear fission is sustainable; it can provide all the energy humanity needs for billions of years.

#### References:

1. ROCKWELL T. *Creating the New World: Stories & Images from the Dawn of the Atomic Age*, 1st Books Library, Bloomington, Indiana (2003) ISBN: 1-4107-0333-9, Fig 7.1, pp.150
2. COHEN BL. “Breeder Reactors – A Renewable Energy Source.” *Am J Phys* **51**(1), Jan. 1983