Nuclear Power is NOT OK!

IICPH Response to OPA Report

by Marion Odell (info@iicph.org)

February 28, 2006

Hon. Dalton McGuinty, Premier
Rm 281 Main Legislative Building
Toronto ON M7A 1A4

Re: IICPH Response to the Ontario Power Authority Proposal

Dear Mr. McGuinty,

I am writing to express the concern of the Institute for the lack of due consideration of the health effects of the continued reliance on nuclear power electricity generation as delineated in the Ontario Power Authority's Integrated Power Supply Plan.

We have a very deep concern with the process whereby the government is making its decisions so far. Without a full exploration of the health effects from nuclear waste and, particularly, particulate radiation from nuclear reactors, I fear that the true hazards to health will not be disclosed. I attended the consultation held in Toronto on the evening of February 15th, which amply demonstrated to me and to others who attended that the process was flawed.

Having now received the brochure, "Our Energy, Our Future " in the mail, there is no doubt that only an inquiry by an independent impartial person such as a judge, where expert witnesses would be called to give evidence concerning the health safety of nuclear power plants, will suffice. Otherwise, the interests of Ontarians and others downwind and downstream will not be served. The bias toward the messages espoused by the proponents of nuclear generation of electricity is simply too evident. From accounts I received, very little was discussed about the health effects of particulate radiation from nuclear power plants. Indeed, there was no opportunity to refute the statements put forth by a proponent for nuclear as those of us who could have done so were cut off without a chance to speak by the moderator.

Setting aside the immense cost of nuclear power plants, their vulnerability to nuclear accidents, earthquake damage, (Pickering sits on the side of Frenchman's Bay near two fault lines), terrorist attacks, their need for shutdowns for expensive repairs, the fact that they leak radioactivity into our environment and as they age, this leakage increases, setting that all that aside, what is the big problem?

Pickering and Darlington power plants are very close to huge populations, the Greater Toronto Area, the Golden Horseshoe and some of the most precious farmlands in the province. What devastation there would be if we had a nuclear accident in this most important area, not only to the people themselves, but to the whole economy of the country! Although our nuclear power plants have a good reputation for safety, there are acts of nature that can cause problems, which if not responded to properly can lead to a nuclear accident. These include such things as earthquakes, thunderstorms, floods and unusual wind conditions Human error can play an important role in meltdowns. There is also the danger of terrorist attacks. Setting all that aside, the most serious threat is that of nuclear waste. From the mining, smelting, refining and manufacture of fuel rods to the actual production of electricity, nuclear waste is produced.

Nuclear Power Plants produce dangerous nuclear waste. They emit radioactive substances into the air and water, in small amounts, but frequently. The solid waste, used fuel rods, contaminated equipment, protective clothing, etc., the plant itself, when finally decommissioned, provide a problem for which there is no suitable secure long-term means of disposal. An organization set up to find a solution, the Nuclear Waste Management Organization (NWMO), wrestled with this problem. Their recommendations did not, in our opinion, produce a safe solution. There is none! Nuclear waste has long been the Achilles heel of the nuclear industry.

Radioactive emissions into air and water at low levels are frequent from nuclear power plants**.** These are most troubling because they add to the nuclear radiation that is already present in our soil, air and water (1). This comes from radiation that occurs naturally to all the so-called "background radiation", residuals from the atomic bomb, testing of bombs, nuclear accidents, the mining, refining and transportation of uranium, the use of radioactive weapons such as depleted uranium, and from the myriads of nuclear power plants around the world. In the U.S. and I believe, in Canada too, the radiation emitted from a nuclear power plant in one year is considered "background radiation" the following year. This is a shell game. It sounds so benign that those lacking knowledge of the nature of ionizing radiation might think it is gone. Of course, it is not really gone, just minutely degraded depending on the half-life of the particular radioisotopes involved. Particulate radiation will remain radioactive depending on the radioisotope from which it is derived. Some half-lives are exceedingly long.

CANDU (heavy water reactors) used in Ontario's nuclear power plants emit tritium into the air in puffs of steam from their stacks and into surface water on a regular basis.

CANDUs emit more than 100 times the tritium released from other reactor designs and also 40 times more Cesium-141. See the report of the Standing Parliamentary Committee on Forestry, Energy and Environment called "The Eleventh Hour" released in January 1988.

Tritium (H-3) is a radioisotope of hydrogen with two neutrons. The rest of the atomic weight comes from one proton. It has a half-life of 12.5 years. It is emitted from a nuclear power plant in the white puffs of steam from its stacks and in water discharged into surface water. Tritium, as a chemical, combines with oxygen just like ordinary non-radioactive hydrogen, forming tritiated water, HTO. It is of concern because it goes wherever water goes whether gaseous, surface or ground water. Tritiated water will go a long way from its source. It is rapidly transported and can travel for long distances. It easily binds with organic molecules and can concentrate in the DNA (2).

Since most of the human body is made up of water, this is a very great concern. Of the tritium you inhale or ingest, 90 % leaves the body quickly, whereas 10% can become joined to organic molecules including proteins and to DNA itself. So here and there these atoms of tritium are radiating in the human body. Every living thing in our biosphere is dependent on water. People who live near nuclear power plants are receiving tritium in the air they breathe and from drinking water on a regular basis. Since children breathe in proportionally more, they are generally more seriously affected. They also play in the dirt. Anyone who eats produce or drinks milk from areas where soil is contaminated by tritium will receive tritium into their bodies. Guess who drinks a lot of milk? Children, babies and nursing mothers do.

Measuring comparative levels of tritium in water is becoming more difficult as more areas are contaminated. For instance, in the Screening Report of 2002, the tritium levels taken from 15 water supply plants in communities across Ontario were used as background controls for the water specimens used to measure tritium levels from the effluent from nuclear power plants. Since tritium can travel a long way from its source, some of the control areas could very well have been within the groundwater/surface water areas affected by the nuclear power plants. Therefore, their estimates of "background" would not be accurate.

Regulations and Standards For the most part, the nuclear industry takes direction for allowable emissions from nuclear power plants from the International Commission on Radiation Protection (ICRP). These standards are not health based, but rather, a risk/benefit trade-off. The regulations for the industry are based on cancer deaths and not on the other myriad health effects of low-level radiation, which include teratogenic and genetic effects and autoimmune diseases. Dr. Bertell believes that it is clear from study of the atomic bomb research that focusing on fatal cancers was a research simplification, chosen for simplicity of calculation, and it was not meant to claim that the only health effects from exposure to radiation were cancers (3).

There is also serious discussion among radiobiologists about the inadequacy of the ICRP model for dose and dose-response, based on the physics model. There is growing agreement that it is inappropriate for application to internal alpha emitters (4). Both NATO and the *Institut de Radioprotection et de Sureté Nucléaire* (IRSN) (5), the French Official Radiation Protection Association, have found the ICRP methodology to be faulty. The Report of the **European Committee for Radiation Risk** (ECRR) presents a more up-to-date model for calculating health risks. Unlike the ICRP, the ECRR uses evidence from the more recent research and new discoveries in radiation biology and human epidemiology, to create a system of calculation which gives results that are in agreement both with the mechanism of radiation action at the level of the living cell and observation of disease in exposed populations.

The ECRR considers the present risk model of the ICRP essentially flawed. "The Committee concludes that the ICRP justifications are based on outmoded philosophical reasoning, specifically the averaging cost-benefit calculation of utilitarianism." Dr. Rosalie Bertell in her article "*Can the ICRP be* Trusted *to Set Radiation Standards*?" states, "The regulations are not a demarcation between safe and unsafe. They are just an arbitrary decision as to how much the public should be willing to tolerate for the benefit of the activity" (6).

As early as the 1950s and 60s, some physicists and other scientists were looking at the possible connections to radiation of **mutations and autoimmune diseases**. The following quote is taken from Chapter 11 of *Principles of Radiation Protection*, a textbook written for Health Physicists edited by Karl Z. Morgan (7), and J.E. Turner published by John Wiley & Sons, New York, 1961. It is taken from Chapter 11 Section 11-7 written by P.R.J. Burch, formerly of the Dept. of Medical Physics, University of Leeds, U. K. The quote in turn references himself and R.G. Burwell in the *Quality Review of Biology,* Vol.40, p. 252, 1965.

"If radiation is capable of inducing the same type of mutation as that which occurs spontaneously, then the problem of assessing the effects of radiation on initiation of autoimmune diseases is entirely analogous to the problem of radiation carcinogenesis described in Section 11-6. ... Nevertheless, it seems quite likely that rather similar spontaneous and radiation mutational mechanisms (spontaneous and induced DNA strand switching) are implicated in the pathogenesis of both autoimmune and malignant conditions" (7).

The official NATO report was dated August 1992, and was submitted to the Defence Ministry in Paris on June 29, 2005.

The Hormesis Theory Consideration of the health effects of nuclear power generation in the industry appears to be influenced by the Hormesis Theory, which advances the

opinion that low dose exposure to ionizing radiation induces "beneficial" effects. Dr. Bertell, in the above noted document, (Ref. 3) page 16, states, "Claims of low dose hormesis have frequently been based on high dose observations, and the only mechanisms offered for these effects has been speculation on repair overshoot at the cellular and genome level. Cell growth as hormetic is the most troubling claim, since illicit growth stimulation signifies catastrophe to biological organisms ... In order to produce one "good" effect, one must endure many other unwanted "bad" effects which will in the long run claim a physiological price perhaps significant, although they evolve to a clinically observable level more slowly."

Some scientific discoveries that support the presence of health effects at low-dose levels.

In the 1960s, women were sometimes given abdominal x-rays in the first trimester of pregnancy. There was anecdotal evidence of an increase in leukemia in the children of these mothers. Dr. Alice Stewart of the UK conducted a pioneering study that showed that a single x-ray in the first trimester increased the chance of childhood leukemia by 50%. Alice Stewart published her first paper in 1955, before there was a nuclear industry. These findings were attacked by medical doctors and radiologist and also by the nuclear physicists who were "managing" the nuclear weapons. Her results have been amply confirmed by the medical data since then (8).

In 1972, Dr. Abram Petkau, a Canadian physician and biophysicist at the Atomic Energy of Canada Ltd. Whiteshell Nuclear Research Establishment, completely overturned all conventional ideas on the biological damage produced by extremely low doses of radiation. This was first published in the March 1972 edition of *HEALTH PHYSICS* in an article called, *Effect of Na-22 on a Phospholipid Membrane.* He reported that cell membranes which could withstand radiation doses as large as tens of thousands of rads when exposed to a short burst of X-rays without breaking, ruptured at less than one rad when subjected to low intensity protracted radiation such as that produced by radioactive chemicals. This finding was completely contrary to all previous observations. This is termed the Petkau Effect. Subsequent investigations by Petkau and their co-workers showed that the cell membrane damage was due to a completely different biological mechanism than the direct hit on the DNA in the nucleus of the cells that had been observed at the high dose.

In his book, *The Petkau Effect* (9), Ralph Graeub states,

> "Over a period of time, such as chronic exposures from inhaled or ingested radioactive materials can be hundreds of thousands of times more effective in destroying cell membranes than the same doses given in a short time as in the case of diagnostic x-rays."

This important discovery sparked subsequent activities by a good number of other researchers but was ignored by regulatory agencies.

In his foreword to the second edition of *The Petkau Effect*, Ralph Graeub of Germany writes,

> "Almost twenty years ago when I published the book *The Gentle Killers: Nuclear Power Stations Unmasked*", the nuclear establishment contemptuously branded me as a lone wolf in the wilderness. Since then, the wilderness has fortunately become much more populated, thanks to the many concerned scientists that have joined the battle against the threat of nuclear power all over the world, mobilized first by the Three Mile Island accident in 1979 and then the Chernobyl disaster in 1986. Today, one survey after another indicates that there has been a complete turnaround in public opinion, so that both in the United States and other countries, those opposed to nuclear power have become a significant majority".

Physicist, Dr. Ernest J. Sternglass (10) wrote an article on his research on low-level radiation about the increased incidence of leukemia from fallout that was published in *SCIENCE* in 1963. The Atomic Energy Commission dismissed his findings stating that his statistics weren't good enough. The statistics he used came from the U.S. Bureau of Vital Statistics. At the time he was director of the Department of Radiological Physics at the University of Pittsburgh Medical School. Hardly what you would call a "kook" but some did call him just that according to Leslie Freeman's book, *Nuclear Witnesses: Insiders Speak Out*.

Karl Z. Morgan, known as the father of health physics, wrote for and edited a textbook, *Principles of Radiation Protection,* published by John Wiley & Sons, New York, in 1967. He looked at such questions as the ratio of alpha to gamma radiation dose in terms of the relative biological effectiveness (RBE) as the dose moves toward zero (low dose range). It states the damage to the cells (RBE) tends to a maximum as the dose becomes smaller in the low ranges. Thus there is more damage to cells at the lower doses of radiation than expected. There is more survivable damage to cells from alpha particles at the lower doses of alpha radiation. That is, the cells are not destroyed, but are damaged. Uranium, radium and thorium are alpha particle emitters

In Chapter 11 of Morgan's text, he discusses not only carcinogenesis and leukogenesis but also the large number of other forms of disease (morbidity) and life-shortening effects based on American radiologists and Hiroshima and Nagasaki survivors. He notes increases in certain non-malignant diseases, the most important group being the degenerative diseases of the cardiovascular and renal systems. "The actual surplus of deaths among the United States radiologists is higher in the cardiovascular-renal group than in the cancer group" (11) and (12).

Other effects, premature aging (13), alpha particles affecting the immune system (14), heredity (genetic effects) (15) are shown in the references below. There are many more studies, a selection of which you can find in the accompanying references.

Most Recent Corroborative Evidence: the Extended Techa River Cohort (ETRC) From 1949 to 1956, the rural villagers who lived along the Techa River in Russia were subjected to both internal and external low-level radiation from a spill into the river from a plutonium production complex upstream from their villages. Their exposure mainly came from consuming water, milk and local food products.

Although some work was done earlier to look at the health effects of those involved, the most comprehensive work has been done in the past ten years. The results of the study of almost 30,000 people born before 1950 who lived near the river some time between 1950 and 1960 provide strong evidence of the correlation between low-level exposure and cancer (16).

Chernobyl Disaster Revisited In September 2005, the WHO, IAEA and UNDP made a joint press release called *"The Heritage of Chernobyl: medical, ecological, social and economic consequences"* which tried to demonstrate that the health consequences of the Chernobyl accident had been exaggerated. This prompted a stern response from the governments of Russia, Ukraine and Belorus. In their press release in repudiation of the WHO/IAEA/UNDP report, they stated,

> "This cynical profanation of the consequences of the biggest technogenic disaster in the history is a sacrilege towards numerous Chernobyl victims; it pushes a new round of pro-nuclear propaganda aimed by the restoration of NPP (nuclear power plant) construction programs. This is the main reason why nuclear industry wishes the whole world to forget Chernobyl."

It states that the report "openly ignores, tendentiously interprets, and even sometimes falsifies the results of the research of thousands of specialists from the Ukraine, Belarus and Russia ... it dissembles the data on the impact of Chernobyl to the countries beyond former USSR borders."

Dr. Bertell has written a critique of the WHO/IAEA/UNDP press release where she disputes the "science of the findings" (17).

There are a plethora of other important studies. I am mentioning only a few:

1. Radiation Risk to low fluences of Alpha particles may be greater than we thought, (18), Centre for Radiological Research, College of Physicians and Surgeons and Environmental Health Sciences, School of Public Health of Columbia University;

2. Confirmation that Ionizing Radiation can Induce Genomic Instability: What is Genomic Instability, and Why Is It So Important, (19), John Gofman, M.D., Ph.D. and Egan O'Connor, Committee for Nuclear Responsibility;

3. How Many Bystander Effects Are There? (20), by Eric J. Hall and Stephen A. Mitchell, Columbia University

CONCLUSIONS

The genetic inheritance from the present use of nuclear power plants already exists and will soon become manifest as it increases with each generation.

- I think it is abundantly clear that low levels of ionizing radiation are not benign or beneficial**.** It is clear from the huge amount of scientifically based peer-reviewed information already available. More and more proof of the deleterious effects of low level ionizing radiation will come to light in the months and years ahead as those who have been affected become ill or pass on their damaged genes onto the next generation.
- The health hazards produced from the use of nuclear power to boil water to produce electricity, if fully understood by the general public from the outset, would have led to the rejection of the use of nuclear electricity power plants. Unfortunately, that did not happen.
- The mounting evidence of the health effects of low-level ionizing radiation calls out for a change in direction away from the use of nuclear power generation.
- The Institute strongly urges the government to call a properly constituted independent inquiry of the type suggested above before making any decision about continuing to use nuclear power for generation of electricity or for any other use.

As a people, it is time for us to look at the evidence with a dispassionate eye not blinded by the mantle of authority of the entrenched interests. The present format consists of day-long open houses followed by evening public input sessions. There is no way such a format can result in meaningful discussion of the concerns with the OPA report. The Canadian public are tired of these "public inquiries" that mean nothing. Only an open, public inquiry with a specific mandate with specific terms of reference to hear and take into account the views of a broad spectrum of experts and concerned citizens, presided over by a judge such as in the case of the Walkerton Inquiry, can satisfy the imperatives of our democratic right to full disclosure.

There is an alternative, and it is feasible. There is no need to build nuclear power plants or lengthy transmission lines! Alternative renewable environmentally benign sources along with conservation can result in less ionizing radiation being added to what has already been produced. Developing renewable energy resources throughout

Ontario would lead to a cleaner environment for all. The leadership provided by Germany, Spain and Denmark should be an example. They have demonstrated the important role that government can play to bring about a strong renewable energy system. More and more of the public are becoming aware of the health effects of not only coal-fired plants, but also of nuclear power plants. In spite of the advertisements of the Canadian Nuclear Association to promote "NUCLEAR" as "CLEAN", more and more people are coming to understand the dangers of low-level ionizing radiation.

The IICPH recommends that the present Ontario government move to phase out the use of nuclear power to generate electricity and move to renewable energy sources as soon as possible The current policies intended to support renewable energy should be greatly magnified. It takes political will at the provincial and federal level to achieve the rates of adoption of renewable energy that are possible and necessary in Ontario. The Province of Ontario could be the vehicle for bringing about the necessary change in direction. It would not be long until the benefits would accrue towards a cleaner environment. You would have the satisfaction of setting a trend that other jurisdictions could follow.

If we love our children and grandchildren, if we recognize that we are stewards of our biosphere, we must not turn a blind eye to the hazards from nuclear radiation. The health risks from even very low levels of radiation need to be recognized. No one is protected from the effects of ionizing radiation. In this 21st century, we are all at risk.

Marion Odell
Vice-President
International Institute for Public Health

cc Hon. Donna Cansfield, Minister of Energy
Hon. George Smitherman, Minister of Health

References:

(1) BEIR 19900 *Health Effects of Exposure to Low Levels of Ionizing Radiation:* ISBN 0-309-03995-9 National Academy of Sciences; *No Immediate Danger: Prognosis for a Radioactive Earth* by Rosalie Bertell. Available through IICPH http://www.iicph.org

(2) *Tritium, Properties, Metabolism, Dosimetry*, www.cerrie.org/committee_papers/Paper_9-01.doc*The Carcinogenic, Mutagenic, Teratogenic and Transmutational Effects of Tritium* http://www.nukebusters.org/

(3) http://www.iicph.org//docs/can_icrp_be_trusted.htm. *No Immediate Danger: Prognosis for a Radioactive Earth* by Rosalie Bertell, Ph.D., G.N.S.H., biometrist and epidemiologist. Still available through IICPH http://www.iicph.org/.

(4) *ECRR Recommendations of the European Committee on Radiation Risk*, Chris Busby, ed., Regulator's Edition.

(5) The official NATO report dated August 1992, which was submitted to the Defense Ministry in Paris on June 29, 2005 and made public by France on July 1, 2005.

(6) ECRR2003 (ISBN 1 897761 24 4) can be obtained from the publisher at a Green Audit price of EU 75.00. Email to admin@euradcom.org for information. The quote can be found at http://www.euradcom.org/2003/execsumm.htm. Dr. Bertell's article is at http://www.iicph.org/docs/can_icrp_be_trusted.htm.

(7) Karl Z. Morgan See other documents in "Human Radiation Studies: Remembering the Early Years" http://www.eh.doe.gov/ohre/roadmap/histories/0475/0475toc.html

(8) Alice Stewart, *Low-level Radiation: The Effects, Human and Non-Human,* http://www.ratical.org/radiation/AliceStewart0800.html; *One Hundred Years After Roentgen,* Proceeds of the International Congress, Berlin, 1995, *Low Level Radiation Exposure Effects in the Tri-State Leukemia Study,* Rosalie Bertell, pages 48 - 59, published 1997.

(9) The Petkau Effect http://www.answers.com/topic/petkau-effect

(10) Ernest J. Sternglass http://www.ratical.org/radiation/inetSeries/nwEJS.html

(11) Radiosensitivity Mechanisms at Low Doses: Inflammatory Responses to microGray Radiation Levels in Human Blood, G.Vickers, Dept. of Biology, University of Bremen, Journal, *International Perspectives in Public Health,* Vol. 9, pp. 4-20 1993.

(12) *X-Ray Exposure and Premature Aging,* Rosalie Bertell, Roswell Park Memorial Cancer Institute, Journal of Surgical Oncology, Vol. 9, 379 - 391 1977.

(13) http://www.ratical.org/radiation/CNR/GenomicInst.html

(14) Alpha Particles http://en.wikipedia.org/wiki/Alpha_particle

(15) Heredity http://www.ratical.org/radiation/CNR/GenomicInst.html

(16) SCIENCE Vol. 310, 11 November 2005, http://www.sciencemag.org

(17) Statement of the Russian Political Parties http://www.iicph.org/docs/russian_parties_response_pressrelease_chernobyl_2005.htm Rosalie Bertell responds to the 2005 WHO/IAEA/UNDP Press Release on Chernobyl

http://www.iicph.org/docs/bertell_response_pressrelease_chernobyl_2005.htm "On Internal Irradiation and Health Consequences of Chernobyl Accident" Chris Busby www.llrc.org/belarus.htm

(18) Radiation Risk to low fluences of Alpha Particles http://www.pnas.org/cgi/content/full/98/25/14410

(19) 100 Years after Roentgen, Proceeds of the International Congress, Berlin, 1995; “Low Level Radiation Exposure Effects in the Tri-State Leukemia Study”, Rosalie Bertell, pp. 48-59, published 1997.

(20) "How Many Bystander Effects Are There?" http://www.crr-cu.org/reports2003/b.pdf

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