WHAT DO WE KNOW ABOUT HIGH LEVEL NUCLEAR WASTE ? May 2010
By Dr. Bill Adamson

Chemistry

Fission of uranium fuel rods in a nuclear reactor splits atoms and releases tremendous heat and radiation. The heat boils water, makes steam, and turns the turbines generating electricity.

In the process, the molecules of the fuel rods are re-configured thereby forming 211 different chemicals—some of them not even found in nature. These waste materials are very radioactive and toxic. Several of them retain their radioactivity for thousands of years. For instance, Plutonium –239 has a "half--life" of 24,000 years, Uranium –235 has a half-- life of 700 million years, Cesium has a half--life of 2,300,000 years, Thorium has a half--life of 77,000 years. (1)

The waste material is so radioactive that if a human were to hold a handful at arm's length, he or she would be dead in less than 5 minutes. That is why nuclear waste must be handled with robotic machinery.

In order to avoid further combustion or explosion, nuclear waste is kept under 20 feet of water in giant swimming pools for 7 years to keep it cooled down. After that, it is stored in giant cement and steel casks in large factory-like buildings for years and years.

Quantities

Nuclear reactors have been storing these hazardous wastes "on-site" for over 60 years. In Canada we have stored up to 2 million fuel bundles or 40,000 tonnes of nuclear waste, enough to fill a skating rink level with the boards. That is a lot of poison!

In the USA the authorities have stored up to 70,000 tonnes of radioactive waste from 104 operating nuclear reactors—enough to cover a football field 20 feet deep. (2)

Remedial Actions

Why do we in Saskatchewan keep mining uranium and exporting it to nuclear reactors around the world? Well, we make a lot of money selling it to others, regardless of the consequences!

When the nasty problem of waste disposal reared its head back in the 1940's, the authorities said that scientists would soon come up with a solution to the problem. That has not happened in over 60 years! Not very promising! Then some have reneged on finding a satisfactory disposal solution because perhaps the wastes could be re-processed to gain even more energy, and to gain more plutonium, which also makes good bomb material.

The USA has made 8 major attempts to find a satisfactory procedure for disposing of dangerous waste, and each time failed. The centralized Yucca Mountain Repository was the major hope for years.

Now, after working on the project for 20 years, and spending over $9 billion dollars, President Obama cancelled the Project and appointed a brand new Committee to research the problem again. (3)

In Canada, there have been 6 major Studies or Reports regarding nuclear power and nuclear wastes—but without a satisfactory method of dealing with the problem. (4)

Germany has been looking for permanent storage for nuclear waste for over 30 years. It tried an experiment of depositing nuclear waste in abandoned salt mines at Gorleben, Moresleben, and Asse. Now the walls of the salt mines are crumbling and falling, and

radioactivity is getting into the underground water. So, Germany is spending millions of dollars to withdraw the wastes, and to shore up the mine walls with concrete. (5)

Japan has not solved the nuclear waste problem, but stores it at on site pools of water and dry storage casks. A severe fire at Tokaimura has shut down one reactor, and the authorities have been alarmed by a serious earthquake that damaged and shut down 7 reactors at Kashiwazake, which does not bode well for deep rock disposal. (6)

Sweden has prepared a deep rock depository, but it is still on an interim basis, and scientists recently are questioning the risks of corrosion in the copper capsules to be buried in bentonite clay and bedrock, and also the quality of the bentonite being recommended. (7)

France, with its 58 reactors, has no geological repository for nuclear waste. It has resorted to reprocessing waste at the French La Hague on the Normandy coast. Much liquid radioactive contamination has penetrated the coastline, reaching up to the Arctic Circle. About 5% of the hottest waste is stored at La Hague, and 95% at Pierrelatte in southern France. It is not recycled or enriched, but some is exported to Russia for enrichment. (8)

The Canadian Story

Our part in the story began in 1944 when Prime Minister McKenzie King secretly joined with Britain and the USA in the research of the Manhattan Project (atomic bomb). Canada supplied the uranium discovered earlier at Port Radium in the North West Territories. From 1945 until 1975 the nuclear industry made no effort to alert Canadians to the huge problem of safeguarding, in perpetuity, the extraordinary toxic and radioactive material coming from reactors.

By 1975, 30 years into the nuclear age, there were dozens of reactors operating in Canada, seven producing electricity, all of them mass producing irradiated nuclear fuel. Sometime in the future,
scientists would decide what to do with the high level waste. The Canadian public was not properly informed of the hazardous nature of irradiated fuel. Most of the decisions and subsidies for nuclear power have been made by Cabinet order-in-council. The nuclear issues have never been brought before Parliament.

It was in 1977 in the Hare Report that geologic disposal in the Canadian Shield was considered, although it emphasized that the safety of the concept had not been "validated." The 1978 Report "A Race Against Time" by the Ontario Royal Commission recommended a moratorium on nuclear power unless a safe method of waste storage could be demonstrated. Other studies and reports followed.

In 1978 the Government of Canada and the Government of Ontario authorized the Atomic Energy of Canada Ltd (AECL) to do a research "to validate" the geologic disposal concept mentioned in the Hare Report.

In 1994, some 15 years and $700 million dollars later, the AECL published a multi-volume report outlining a deep rock disposal plan. Then, an Environmental Assessment Panel (the Seaborn Panel) was appointed to evaluate the AECL plan.

The Seaborn Panel spent 8 years and $7 million dollars holding consultations and reviews all across Canada. It concluded that the geologic disposal concept had not been demonstrated to be adequately safe, and that it was not considered a socially acceptable approach in the eyes of the Canadian public for a variety of reasons.

The response of the Government of Canada was to arbitrarily appoint a Nuclear Waste Management Organization (NWMO) of representatives from Ontario Power Generation,

NB Power, and Hydro Quebec, all members with a vested interest. This was in complete contradiction to the recommendation of the Seaborn Panel to select a group of scientists at arms-length from government and industry, to recommend a future strategy. The Federal Cabinet had decided on the deep-rock disposal option.

In May of 2005, the NWMO issued a lengthy report entitled, "Choosing a Way Forward." (9) It was essentially a rehash of the AECL Plan, with a fancy phrase attached—"adaptive phased management." Nothing new was added, but the deep rock burial system was to be stretched out over a 100 years or so. Shortly afterward, a pointed and telling critique of the Report was issued by Dr. Gordon Edwards, entitled "Following the Path Backwards," and published by Nuclear Waste Watch. (10)

Now, the NWMO is going across Canada, promoting its plan, and trying to locate a site for deep rock burial of the high level nuclear waste, hoping to find a community that will accept it.

The NWMO officials do not publicly mention that a Scientific Review Committee of top scientists, prior to the Seaborn Report, had assessed the AECL Plan and found some 90 problems that needed to be addressed before it was safe. The NWMO has never mentioned how it would remedy those problems with deep rock disposal. (11)

The NWMO officials do not mention the research of the geologists, P. Fritz and S.P. Frappe entitled, Saline Waters and Crystalline Rocks, which revealed that there was salt water, under extreme pressure, underlying the pre-Cambrian rock of the Canadian Shield. They do not know how it got there, but they know it is there. Their research was prompted by the underground water in all of the deep-rock gold mines across Canada. (12)

The NWMO rarely mention the AECL Whiteshell Research Laboratory and experimental deep rock shaft at Pinawa, Manitoba. After 15 years the project was closed down and decommissioned. Why? Because of a continuous inflow of underground water!

The NWMO perpetuates the illusion that Canadian Shield rock is hard, dry, solid, and a good place to bury high level waste, toxic for thousands of years.

Dr. Gordon Edwards illustrates the basic issue when he writes: "Nevertheless, the Government of Canada has spent $17 billions of taxpayers' dollars promoting nuclear power and it can't seem to bear the idea of phasing it out." (13)

What do we know about high level nuclear waste? More than enough! The hard nosed research and decision making lies before the people of Canada.

In the book, Small is Beautiful, E.F. Schumacher wrote: "No degree of prosperity could justify the accumulation of large amounts of toxic substance which nobody knows how to make it 'safe' and which remains an incalculable danger to the whole of creation for historical and even geological ages. To do such a thing is a transgression against life itself, a transgression infinitely more serious than any crime perpetrated by man.

The idea that a civilization could sustain itself on a basis of such a transgression is an ethical, spiritual and metaphysical monstrosity It means conducting the economic affairs of man as if people did not matter at all. "(14)

By Dr. Bill Adamson, Member,
The Inter-Church Uranium Committee Educational Co-operative (ICUCEC)
Saskatoon, SK.

END NOTES

(1) "Some of the Radioactive Poisons in Used Nuclear Fuel," Adapted from Appendix F of ATOMIC ENERGY OF CANADA, LTD'S Environmental Impact Statement.
See also: http://www.cbc.ca/canada/story/2009/08/18/f-nuclear-waste-storage.html

(2) See tjames@cavan.org or http://www.yeip.ca

(3) "Federal Panel to examine nuclear waste storage—Yucca Mountain won't be included in options." Stephens Washington Bureau, by Steve Tetreault, Las Vegas Review Journal, Jan. 30, 2010. http://www.lvrj.com/news/federal-panel-to-examine-nuclear-waste-storage-83143397.html
See also: stetreault@stephensmedia.com

(4) 1976—The Flowers report; 1977—The Hare Report; 1978—Porter Commission Report; 1980-- Select Committee on Ontario Hydro Affairs; 1987--The Brundtland Report;1998—Seaborn Report.

(5) "The Curse of Gorleben—Germany's Endless Search for a Nuclear Waste Dump," by Spiegel Staff, January 10, 2010. http://www.spiegel.de/international/germany/0,1518,672147,00.html
See also: "Environment: Germany Leaks Raise More Nuclear Fears," by Julio Godoy, Berlin, July 8, 2006 (Inter Press Service).

(6) The Japan Times: Sunday May 23,2004
http://search.japantimes.co.jp/print/f/20040523x2.html See also:"Japan hit bt 2nd quake," CBC News, July 16, 2007 http://www.cbc.ca/world/story/2007/07/16/japan-earthquake.html

(7) A Paper by the Swedish NGO for Nuclear Waste Review, Goteburg, Sweden.
http://www.springerlink.com/content/e2h631181654664k
http://www.guardian.co.uk/environment/2009/nov/14/copper-nuclear-containment-vasasweden
http://www.guardian.co.uk/environment/2009/nov/14/copper-nuclear-containment-vasa-   sweden

(8) "Nuclear 'Renaissance' or 'Retreat'? France is not the Example," by Linda Gunter, from Beyond Nuclear. See also: http://freepress.org/columns/display/7/2009/1732

(9) "Choosing a Way Forward," May 2005, by the Nuclear Waste Management Organization.
http://www.nwmo.ca/rapportdetude

(10) "Following the Path Backward," by Dr. Gordon Edwards, President of the Canadian Coalition for Nuclear Responsibility, and prepared for Nuclear Waste Watch.
http://www.ccnr.org/follow_path_back.pdf

(11) See Google: "Deficiencies in AECL's EIS Identified by the Nuclear Scientific Review Panel." See summary list of 10 items.

(12) P. Fritz and S.K. Frappe, Saline Waters and Crystalline Rocks, Published by The Geological

Association of Canada, 1987.

(13) Dr. Gordon Edwards, Following the Path Backwards, p. 22.
http://www.ccnr.org/follow_path_back.pdf

(14) E.F. Schumacher, Small Is Beautiful, Published by Blond and Briggs, 1973, pp. 121-122.