In the opinion of the Atomic Energy Control Board (AECB), the performance of a waste repository must be such that there will be only the slightest probability of radiation doses to individuals from the stored waste exceeding a small fraction of the doses that can be received from natural background radiation.[18] To assess the acceptability of any disposal facility for which projected doses are being established, we must abide by criteria expressed in terms of the risk involved. "Risk" is defined as the probability that a fatal cancer or a serious genetic effect will occur in an individual or in his or her descendants. With respect to ongoing, lifelong exposure to radiation, the ICRP's current opinion is that the principal limit on effective dose equivalent to members of the public ought to be 100 millirems (1 millisievert) per year, taking into account exposure from all sources other than medical irradiation and natural background radiation. It should be noted that the probability of a fatal cancer or serious genetic effects associated with a dose of 1 mSv is two cases per 100,000.

The AECB regards one case per million people per year as an acceptable level of risk in meeting the objective of minimizing repercussions on future generations. This risk corresponds to an individual dose level of 0.05 mSv per year, or 2.5 per cent of the dose received annually from natural background radiation by the Canadian population generally (see Appendix B).[19]

The Characteristics and Dangers of Nuclear Fuel Waste

The production of radioactive waste is part of the fuel cycle, which goes from extraction to (potentially) reprocessing. Although there is no universally applicable classification of wastes, the nuclear industry does recognize different categories of waste: low level (for example, certain medical or industrial material), intermediate or medium level (certain solid wastes from nuclear reactors) and high level (products of fission and actinides).[20] Actinides (plutonium, americium and curium) are heavier elements than uranium, created when a uranium atom[21] absorbs a neutron without the occurence of fission. The most common actinide is plutonium 239, a fissionable element that can produce energy in a reactor and which consequently has great potential as fuel (hence the attraction of recycling spent fuel). The products of fission (iodine, xenon, krypton, etc.) slow down the chain reaction produced in the heart of the reactor, by absorbing neutrons and preventing them from causing the fission of other uranium atoms (see Tables 3 and 4). When too many products of fission accumulate in a fuel bundle, it ceases to function and must be removed from the reactor. It also becomes highly radioactive and gives off a great deal of heat. It should be noted that a fuel bundle stays in the reactor for about a year and a half, until approximately 70% of its uranium 235 has been consumed.[22]

The term "waste" refers to any material for which no further commercial use is envisaged, and which must therefore be disposed of. As a general rule, the phases of the management of radioactive waste include collection, assessment, processing, treatment, transportation, storage and disposal. High-level radioactive wastes are stored in facilities

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[18] Atomic Energy Control Board, *Deep Geological Disposal of Nuclear Fuel Waste: Background Information and Regulatory Requirements Regarding the Concept Assessment Phase*, regulatory document R-71, Ottawa, January 29, 1985, p. 9.

[19] Atomic Energy Control Board, *Regulatory Objectives, Requirements and Guidelines for the Disposal of Radioactive Wastes — Long-Term Aspects*, regulatory document R-104, Ottawa, June 5, 1987, p. 5-6.

[20] OECD Nuclear Energy Agency (1984), p. 17.

[21] The only chemical element capable of fission under the action of slow neutrons is uranium 235.

[22] Robert Lyon and Marvis Tutiah, *Nuclear Waste Management: Protecting the Future*, Pinawa, Atomic Energy of Canada Ltd., January 1984, p. 18-20.