economic value was assigned to the spent fuel.[46] However, it must be kept in mind that only 70 per cent of the fissile material is used during this fuel cycle, and that the spent fuel contains products such as plutonium 239 and 241. Recovery of plutonium (an artificial fissionable element) through reprocessing of the spent fuel is carried out because other fuel cycles based on plutonium are possible.

The development and use of plutonium cycles are increasing the amount of energy that can be extracted from natural uranium. The use of plutonium recovered from spent fuel makes it possible to produce twice as much electricity while cutting the demand for uranium in half. Thorium cycles (thorium 232 + neutrons = uranium 233) or thorium-plutonium cycles are also possible. To this may be added the fast neutron, or breeder reactor, which makes it possible to use almost all of the uranium by transforming non-fissionable uranium 238 into plutonium.[47]

It is not up to this Committee to determine definitively whether waste should be reprocessed or not. However, we note that there are techniques likely to reduce the volume of spent fuel, that countries such as France, England, Japan, Belgium, West Germany and Italy either use or are very interested in; but the Canadian concept of spent fuel waste disposal does not include the possibility of reprocessing waste. Considering the risks associated with the handling and the future transportation of high-level radioactive waste, the lifetime and the specific activity of the fissionable plutonium (see Table 3), the Committee recommends that:

Recommendation 2

> **The Department of Energy, Mines and Resources, in collaboration with the National Research Council, should produce a detailed study on the short and long-term advantages of using various fuel cycles that could reduce the volume and diminish the risks of the waste produced by CANDU reactors. In addition, Energy, Mines and Resources should work to develop techniques that reduce the volume of waste produced by existing reactors.**

During the Committee's hearings, arguments have been invoked against AECL's current participation in research into disposal of high-level radioactive waste including conflicts of interest, a past record sullied by fanciful predictions, and foreign involvement in its research projects. According to Norman Rubin, Director of Nuclear Research for Energy Probe, the nuclear industry, which has always insisted that it could dispose of its waste in an acceptable and economical manner, will find a solution that strikes it as economical and will then do its best to make the rest of us accept it. Energy Probe claims that AECL cannot run a viable and credible research project because its own spokesmen are on record as saying that nuclear waste is a public relations problem rather than a technical one.[48] Energy Probe therefore recommends that:

> This Committee should formally recognize the inappropriateness of giving prime responsibility for, and control over, the waste program to AECL, and should strongly recommend a restructuring of the program. It may be possible for many of the staff and facilities of the Whiteshell Nuclear Research Establishment to continue in this program, but it is vital that they no longer report to AECL management, and that they

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(46) A.M. Aikin, J.M. Harrison and F.K. Hare, *The Management of Canada's Nuclear Waste*, Energy, Mines and Resources Canada, Ottawa, 1977, p. 13.

(47) OECD Nuclear Energy Agency, International Atomic Energy Agency, *Nuclear Energy and its Fuel Cycle: Prospects to 2025*, Paris, 1987, p. 72-76.

(48) Norman Rubin, "The Mismanagement of Canada's Nuclear Waste Management Program", brief presented to the Standing Committee on Environment and Forestry, Ottawa, February 3, 1987, p. 5.