

The Need to Preserve Nuclear Fuels and Materials Knowledge

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The demand for nuclear power will likely substantially increase in this century. Developing countries are already including new nuclear plants as an important part of their mix of energy generators. The energy shortage in the United States coupled with the recent improvements in the economic competitiveness of nuclear power is causing a reevaluation of the nuclear power enterprise. Even more importantly is the growing concern over CO₂ emissions from fossil fuel combustion, the curbing of which could increase the price of the coal option still further. Nuclear energy reduces the CO₂ burden directly by displacing fossil energy generation of electricity. In the future, the contribution of nuclear energy to the climate change problem may be even greater if nuclear energy is used for hydrogen generation in the transportation sector.

With a reasonable projected growth of nuclear power, the world's supply of U235, which can be practically recovered, will be exhausted by mid-century. Therefore, the deployment of the fast breeder reactor to convert the enormous supplies of uranium and thorium to fissile material is inevitable.

The question is whether the fast breeder reactor and the associated reprocessing will be ready for deployment when needed. Presently, only Japan and Russia have active programs, all others being already closed or placed in the process of closure. A review and current status of fast breeder reactor development will be presented in an attempt to address this question.

Most believe that fast breeder reactors and their supporting development and confirmation programs will be necessary within a few decades. Thus, the issue of having the right information at that time, to avoid reinventing the wheel, becomes an issue of preserving that information we now possess. In turn this includes gathering pertinent information that might exist only within the minds of aging and retiring experts as well as accumulating reports, data and samples. Then the information must be stored in an easily accessible and searchable form; and maintained over a long time during which management, hardware, software, and priorities are likely to change.

Some of this work is being done in other technical areas but in the fast reactor field, the preservation programs are limited to benchmarked data and published reports. There are no programs to gather tacit information, material samples or technical failures that provide the basis for development decisions. We summarize the existing state of affairs and make some suggestions for ensuring the success of fast reactor development at a time when they are needed to obviate diminishing fuel supplies in the future.