

Perspectives on Future Fuel Cycle and Repository Technologies

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The talk provides a historical perspective to the US nuclear waste program and how it is affected by and affects reprocessing of commercial spent nuclear fuel. The two subjects are interconnected due to the effect of reprocessing (or not reprocessing) on waste volumes and disposal requirements. In the past several years, waste disposal options and requirements have led to proposals in which the design of the commercial reactor system is driven by the waste system; this is reflected in DOE's GNEP program.

The U.S. policy towards reprocessing has swung back and forth from the early 1970's and before. In the early days of commercial nuclear power, the assumption was that the fuel cycle should be closed via reprocessing. Uncertainty about the supply of uranium and success with breeder reactor demonstration projects led many in the industry to believe that the future of commercial nuclear power was in a mix of breeder and conventional water reactors, fuel recycle, and mixed oxide fuel.

The U.S. move away from reprocessing in the Ford and Carter Administrations (mid to late 1970's) was based in part on the realization that the economics of reprocessing at that time were not favorable and that proliferation concerns may not have been adequately addressed. This attitude shift in the U.S. has not been in phase with policies in Europe and Japan where reprocessing at a commercial scale has been pursued.

While not a subject of this presentation, the economics of reprocessing and of the associated facilities (e.g., burner reactors) appear to pose a major disincentive to reprocess at this time, and a thorough comparison of the total cost of alternative nuclear power systems does not appear to be available. To the extent that many of the components of such a system have not been built at a commercial scale, present estimates are uncertain.

The talk concludes with observations about the intersection of the selection of the fuel cycle and waste disposal in the U.S.