Research and development efforts related to operation in environments of fast flux and high-temperature liquid metal were initiated. These efforts culminated in the construction of two fast reactors in the mid-1950's, the 20-MW(e) Experimental Breeder Reactor No. II (EBR-II) and the 60-MW(e) Fermi reactor.

Several factors worked against immediate success in terms of the commercial exploitation of the breeder reactor. Breeder development was essentially confined to the national laboratories, and industrial involvement was minimal, with the exception of the Fermi development effort. The industrial groups were concentrated on the light-water reactors and the nuclear Navy, where the prospect of success was nearer at hand. The proven uranium resources appeared sufficient to meet projected requirements. Although a substantial technological base, including test facilities, was being developed in the laboratories, until the mid-1960's there appeared to be no urgent requirement to channel the major part of our effort and resources into the breeder program.

About four years ago, when we felt the time was right to embark on an intensive breeder-reactor development program aimed at making this type of reactor a commercial reality, we knew full well that it would be a difficult, complex, and costly undertaking. Given the many pressing national needs competing for funds in a finite budget, we also knew it would probably not be possible to go forward with intensive parallel development of machines for both the uranium and thorium cycles, even though each was extremely promising. A choice was needed and one was made. The route chosen was the uranium—plutonium one.

It was further decided to focus efforts on the Liquid Metal Fast Breeder Reactor, or LMFBR for short. Liquid metal (sodium) was chosen as the coolant for several reasons, among which was the fact that over the years substantially more experience had been acquired in the laboratories and industry, both here and abroad, with liquid-metal systems than with the other coolants for the breeder application. This experience included that gained from operation of a number of experimental reactors using a liquid-metal coolant. These reasons were strong enough to offset some unfavorable characteristics of sodium, such as its high chemical reactivity.

Although priority has been given to the LMFBR, investigations are continuing on other advanced reactors that have an important potential for increased fuel utilization or breeding. These include two thermal