research, "is directed toward ferreting out their nuclear and chemical properties in order to lay a base for a general understanding of the field."

Of the transuranic elements, an isotope of element 98 garnered greatest attention. Named for the state where it was discovered, californium-252 fissions spontaneously and is an intense source of neutrons, able to penetrate thick containers and induce fission in uranium-235 and plutonium-239. It could provide short-lived, on-site isotopes in hospitals for immediate use in patients. Cancerous tumors could be treated by implanting californium needles instead of the less effective radium needles used previously. Other transuranic elements afforded practical applications such as tracers for oil-well exploration and mineral prospecting.

Thanks to Weinberg's foresight in demanding beam ports, Wallace Koehler, Mike Wilkinson, Henri Levy, and their associates in the Solid State and Chemistry divisions could use the high-flux reactor's intense neutron beams for materials studies. Of particular significance were materials investigations that focused on the magnetic interactions of neutrons with materials, which helped to explain unusual magnetic properties of rare earth metals, alloys, and compounds.

The High Flux Isotope Reactor served science, industry, and medicine for more than a quarter century. Although shut down because of vessel embrittlement in November 1986 and subsequently restarted at 85% of its original power, by 1991 it had gone through 300 fuel cycles that provided benefits ranging from advancing knowledge of materials to enhancing understanding of U.S. history. In 1991, neutron activation analysis of hair and nail samples from the grave of President Zachary Taylor indicated he had not been poisoned by arsenic while in office, as one historian suspected. Americans can rest assured knowing that President Taylor died of natural causes—thanks to the Laboratory's High Flux Isotope Reactor and to the analysis made there by Larry Robinson and Frank Dyer, both of the Analytical Chemistry Division.

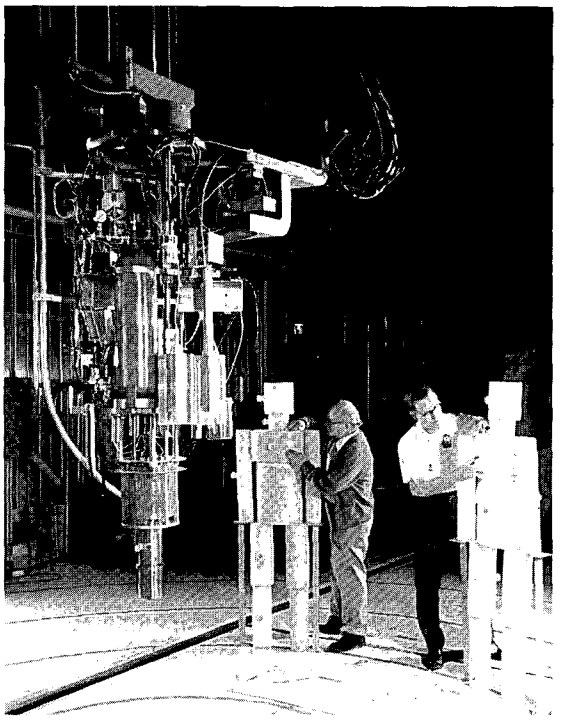
The Last Reactors

Between the 1940s and 1960s, new reactor construction was part of the Laboratory's ever-changing landscape. Those built in the 1960s, however, would mark the end of the Laboratory's "bricks and mortar" reactor era. No new reactors would be built during the 1970s and 1980s, a remarkable dry spell given the rapidly changing nature of nuclear research.

Before being forced to close its doors on new reactor construction, the Laboratory (in addition to its work on the High Flux Isotope Reactor) completed the Health Physics Research Reactor, experimented with a molten-salt reactor, and conducted research for AEC's liquid-metal fast breeder reactor and for high-temperature gas-cooled reactors that stirred the interest of the private sector. Next to the High Flux Isotope Reactor, the longest-lived Laboratory reactor built during this decade was the Health Physics Research Reactor.

Known originally as the "fast burst reactor," the Health Physics Research Reactor was installed

"Cancerous tumors could be treated by implanting californium needles instead of the less effective radium needles used previously."



Phantoms for estimating radiation doses in the human body are checked at the Health Physics Research Reactor.