

Eli Greenbaum studies photosynthetic water splitting for releasing energy-rich gases and makes bioelectronic materials. Mark Reeves and James Thompson work behind him.

## Advanced Energy Systems

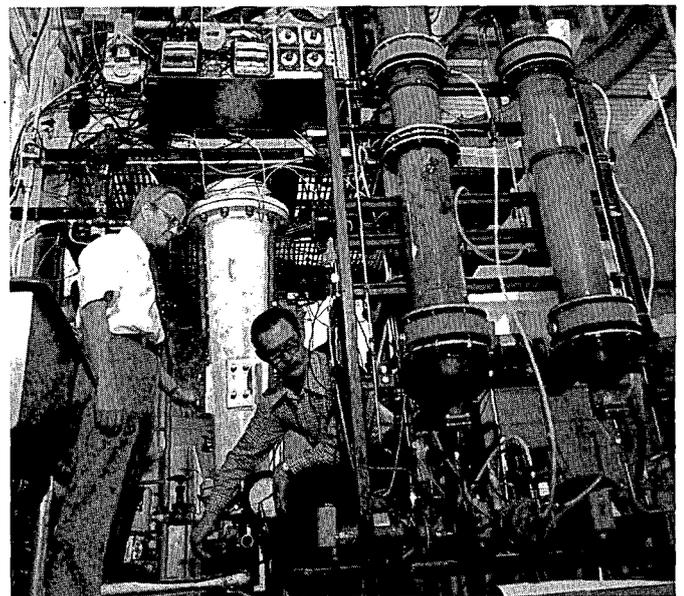
Murray Rosenthal's advanced energy systems activities, including the fossil energy, conservation, and fusion programs, were threatened with loss of program support during the early Reagan years. The Reagan administration dispensed with most of the fossil energy program, severely curbing fossil energy research at the Laboratory. However, after a brief and limited decline, the energy conservation program began to grow again. The fusion program, moreover, continued to progress and received DOE and congressional approval to build two substantial plasma confinement experiments.

One of the ORNL fusion projects, known as the Advanced Toroidal Facility (ATF), was the world's largest stellarator. The stellarator concept had been investigated earlier in the United States at Princeton Plasma Physics Laboratory, but it was difficult both to analyze and build. Most of the U.S. effort was devoted to the newly invented tokamak. However, stellarator development was continued

elsewhere in the world, most notably in Germany, Japan, and the Soviet Union. ORNL recommended to DOE that the prospects for this fusion approach were promising enough that the United States should reenter the field. After a period of review, DOE concurred and the ATF was built at the Y-12 Plant on the site of earlier tokamaks using major pieces of equipment remaining from that program.

The other experiment that evolved from the Laboratory's ELMO Bumpy Torus program was known as EBT-II. After a contract to build EBT-II had been awarded, the Fusion Energy Division's refined analysis of the original Elmo Bumpy Torus program indicated that EBT-II's performance would not be as

promising as predicted earlier. The Laboratory recommended that its EBT-II program be terminated, and a panel of fusion experts agreed.



Charles Scott and Charles Hancher examine a fluidized-bed bioreactor used to reduce nitrate concentrations in wastewater.