KNOLLS ATOMIC POWER LABORATORY
Niskayuna, New York

Map 7-10 **Photograph 7-9**

AT THE CLOSE of World War II, General Groves offered the job of managing the Hanford Reservation to the General Electric Company (GE). However, GE was more interested in reconverting its factories from military hardware to civilian products. Nevertheless, Groves was desperate and proposed an enticing offer: If GE assumed the Hanford contract, it could design and construct a government-owned atomic power research laboratory at The Knolls, a former country estate above the Mohawk River near Schenectady. GE took the bait, even so negotiating several key conditions: freedom from all liability from atomic operations, full recovery for all costs associated with the operations, and the right to stop operating the Hanford Reservation whenever it chose, while still retaining the right to operate the new laboratory at The Knolls. In late 1946, the MED signed an interim contract with GE. A few months later when the AEC learned of the contract conditions it had inherited, the members had some heated words for Groves and GE, though they eventually agreed to the terms. The new mission of the Knolls Atomic Power Laboratory (KAPL) soon crystallized into two areas: provide technical and scientific support to GE's Hanford operations, and develop and design nuclear power reactors, in particular for Navy submarines. The nature of the operations at the laboratory remained a secret shrouded from the local community for many years.

In late 1947, shortly after GE broke ground at the riverfront property, the Hanford Reservation requested that the KAPL construct a pilot plant for the new REDOX chemical extraction process that separated plutonium and uranium from the mixed fission products in irradiated reactor fuel. Planning proceeded quickly, but the buildings for the new Separations Process Research Unit (SPRU) did not rise from the ground until the next fall. SPRU consisted of a main research and pilot plant facility (Building G2), a waste processing facility (Building H) connected to G2 by an underground tunnel, pilot plant laboratories (Buildings G1 and E1), and a radioactive material laboratory (Building E2). For safety, Buildings G2 and H also contained large underground workspaces. The KAPL used several of its buildings (K-Buildings) near the Mohawk River to contain and store radioactive and chemical wastes.

Scientists developed, tested, and practiced REDOX extractions in Building G2. Engineers devoted a large portion of Building G2 to five, 25-foot tall hot cells lined with stainless steel floors and buttressed with 5-foot thick concrete walls. To access the interiors of these hot cells, workers removed massive concrete plugs from the ceilings with 6-ton capacity cranes mounted in a tall crane gallery and machine shop. Workers could also enter the bottom of the hot cells via a narrow basement corridor. Numerous pipes carried highly radioactive fluids between the process cells and through underground

passages into Building H. During a typical operation, workers moved a shielded carrier containing slugs of irradiated uranium into the crane gallery. Then they unbolted a floor hatch above Cell 2, positioned the carrier over the hatch, and released the slugs down a 6-inch diameter tube into a dissolver tank. After the aluminum slug jackets and uranium had mostly dissolved, workers routed the solution batchwise into a centrifuge in Cell 1 for physical separation from the undissolved components. Mixer-settlers in Cells 3 and 4 further chemically separated the uranium from the plutonium. Other equipment in Cell 5, the largest of the hot cells, completed the separation and concentration of uranium and plutonium. The high radiation levels made much of the lower level of Building G2 uninhabitable during separation operations, although some workers did enter these "hot" areas for short periods to service the equipment. Workers in Building H received waste fluid from Building G2 through the underground tunnels, processed it within five concrete neutralizer cells, and pumped it into seven large stainless steel tanks located within underground concrete vaults. By late 1950, the scientists at SPRU had worked through their large-scale REDOX process, and the new separation plant at the Hanford Reservation could begin operations.

After successfully establishing the REDOX process, the KAPL modified its SPRU facilities to help develop a new continuous solvent extraction process called PUREX, which the SRP later used. By the summer of 1953, the KAPL terminated SPRU's research activities and shortly thereafter placed it on standby. Eventually, the Hanford Reservation likewise adopted the PUREX process as a replacement for REDOX, and the chemical processing plant at the National Reactor Testing Station in Idaho employed PUREX for reprocessing spent highly enriched uranium (HEU) from Navy reactors. Also, during the mid-1950s scientists at SPRU worked with the Hanford Reservation, the Oak Ridge Reservation, and the SRP to develop the thorium extraction (THOREX) method for separating thorium-232 from fissile uranium-233.

In the early 1950s, the KAPL's mission expanded into development of classified power reactors for the Navy, under the watchful eyes of Captain Rickover, the crusty and belligerent father of the nuclear Navy. GE finally gave up any hope of developing civilian reactors at The Knolls, and during the 1960s the laboratory decommissioned and converted several portions of Buildings G2 and H and drained radioactive wastes from their underground tanks. In 1990, the DOE initiated an on-going radiological surveillance program at SPRU with the goal of eventually decommissioning its highly radioactive structures. GE terminated its management contract for the KAPL in 1993 as part of divesting itself of most defense-related businesses. Today under the auspices of the National Nuclear Security Administration (NNSA), the KAPL's staff of 2,800 government and contractor personnel design, build, and test prototype naval nuclear reactors and train Navy personnel to operate and maintain them.

The main laboratory complex at the KAPL spreads across about 170 acres of bluff above the Mohawk River near a quiet residential neighborhood. An additional 4,000 acres of undeveloped land,

owned by the laboratory, lies to the southeast. Public access is firmly prohibited due to the ongoing secret naval reactor research. Two entrances at the front of the laboratory flank a large crowded parking lot. A silver water tower beyond the parking lot rises above the two-dozen or so buildings. The flat-roofed buildings of SPRU stand on the northern side of the complex beside a laboratory access road. A large open field, also part of the KAPL, lies west of this road. Windows penetrate the gray metal walls of the western sides of the 40-foot tall Building G2 and the 20-foot tall Building H2 (formerly identified as Building H). An antenna lashed to a 2-story steel girder structure rises from the top of Building G2, and a 4-story silvery vent stack rises from the western side of Building H2. Smaller sets of windows line the brown concrete 2-story Building G1, which is attached to the southern wall of Building G2. Buildings E1 and E2 are not visible from outside the complex.

How Do I Get There?

The KAPL is located about 4 miles east of downtown Schenectady. From Schenectady, drive northeast on the Crosstown Connection (SR-7), turn left onto Schenectady Troy Road (SR-146), and then immediately turn right onto Rosendale Road. Drive east 2 miles, and turn left onto River Road. Drive north about 2.5 miles, and the KAPL is on your right. SPRU buildings are visible to the northeast once you pass the access road that borders the west side of the main parking lot. To see the riverfront portion of the KAPL, continue driving north on River Road, pass the GE Research Laboratory on your right, and then turn right onto SR-146. Drive north 1.5 miles, go over the Mohawk River, and turn right onto Riverview Road. Drive southeast for 3 miles, turn right onto Brian Drive, and follow it to the river. From here, you will have a clear view of some of the KAPL and the GE Research Laboratory.