Storing nuclear wastes: More precise data needed

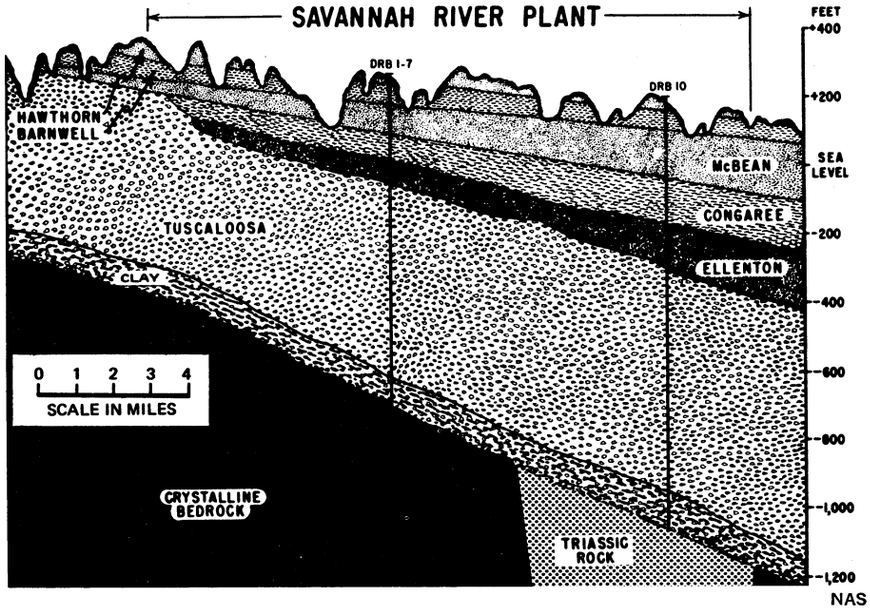
Twenty three nuclear power plants are now in operation, but the question of how to dispose of the radioactive wastes they produce is yet to be fully answered. The Atomic Energy Commission plans to construct an underground national repository for the wastes somewhere in Kansas. Meanwhile, AEC's Savannah River Plant near Aiken, S. C., has been accumulating wastes for some 20 years. These wastes are now stored in tanks, but the AEC is considering injecting them into tunnels in the bedrock beneath the plant site. It asked the National Academy of Sciences to evaluate the proposal.

In a report issued last week, the NAS Panel on Bedrock Disposal concludes that any storage method must protect the living environment from radioactivity for at least 1,000 years and should, ideally, be independent of social or political change. The wastes could be kept in tanks indefinitely, the panel concedes, but the tanks must be replaced periodically and constant surveillance is needed. Bedrock storage, concludes the panel, provides a "reasonable prospect" for long-term safe storage, but "an unprecedented degree of precise information" is needed to decide if and where underground storage vaults should be built.

So far, the AEC has learned the general structure of underlying rock from a limited number of borings from the surface, but information on rock permeability, groundwater movement and location of fractures in the rock is needed. The only way to get some of the information needed is to sink an exploratory shaft 15 feet wide into the rock selected and dig tunnels eight feet wide horizontally from the shaft.

Two types of bedrock underlie the plant site: crystalline metamorphic rocks and sedimentary rocks of Triassic age (230 million to 180 million years). Above this rock is the Tuscaloosa formation, a prolific source of freshwater. Between the Tuscaloosa formation and the metamorphic rock is a layer of clay that would be a good barrier to leakage of radioactive fluids from below.

E. I. du Pont de Nemours & Co., prime contractor of the SRP, has proposed a vault excavated at a depth of 1,500 to 1,900 feet in the metamorphic rock. Six tunnels, separated from the main shaft by concrete bulkheads, would hold 100 million gallons of wastes. Once in the tunnels, the wastes will seep into the surrounding rock. The question that must be resolved is how far the wastes can travel before they are no longer hazardous. Based on available information, the NAS panel estimates that if gases generated by radioactive decay are vented from the vault, the wastes would remain within a half-width of the SRP site a minimum of 1,200 years. The Triassic rock, however, appears to offer a potentially superior setting for the vault. It is extremely impermeable, there is a low rate of water seepage, and there appear to be no zones of close fractures. Wastes in these rocks would remain below the Tuscaloosa formation and within the boundaries of the SRP site for tens of thousands of years, the panel estimates. On the other hand, the layer of clay that overlies the metamorphic rocks is thin or absent in the three cores from the Triassic region.



NAS says "an unprecedented degree" of data is needed to select storage site.

A spokesman for the AEC says that finding a permanent waste repository for the Savannah River Plant wastes is not urgent, but the agency agrees with the NAS panel that exploratory tunnels are needed. It in fact has requested $15 million for such study in the AEC budget for fiscal 1973. The AEC is also considering bedrock storage for wastes generated at its plant at the Hanford Reservation in Washington. □

Unemployment up for down chemists

For 30 years American chemists have enjoyed a place in the sun. But if employment is any indication, their heyday is now in eclipse. Unemployment among chemists and chemical engineers is up since last year and the outlook for the future is even darker.

The American Chemical Society's Department of Professional Relations and Manpower took a survey of society members in February. The results, published in the May 8 CHEMICAL AND ENGINEERING NEWS, show that 3 percent of the 25,500 responding chemists are unemployed. The rate was 2.7 percent at the same time last year. The figure for chemists compares with an unemployment rate for all professional and technical workers of 2.5 percent.

Hardest hit among the chemists are those under the age of 25 and women. Unemployment for the under-25 chemists has tripled to 24 percent in one year. For women chemists it has risen from 6.3 to 7.3 percent. Nearly half of the unemployed chemists were formerly employed in jobs supported by Government funds.

Based on this survey, the total number of unemployed chemists is about 5,600. Those employed in part time or temporarily (1.5 percent) and subprofessionally (2.7 percent) represent another 7,900 job-seekers. Add to this about 13,000 of the 20,000 chemists and chemical engineers graduating this year and the total is more than twice the number of jobs available in a normal year.

Robert Henze of the ACS says, "Further deterioration of the chemical employment situation in the face of an upturning economy is clear evidence that special temporary employment programs are needed." He suggests utilization of valuable scientific talent in Federal, state and city laboratories. Other ACS members have suggested that chemists and engineers form a union as a partial solution to the unemployment problem. Alan C. Nixon, president-elect of the ACS, has various other solutions, including making the ACS an organization that is more responsive to the professional problems of its members. *See p. 313.* □