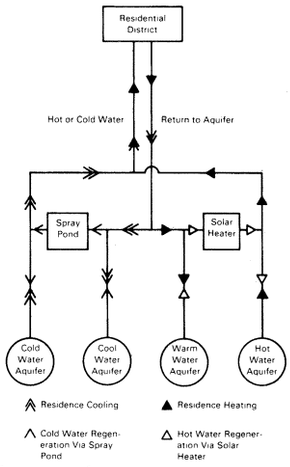
ENVIRONMENT

Aquifers for solar power storage



Almost everyone agrees that solar power, if the developed technology were available, would be the best energy alternative for many geographic areas. But, comes the usual counterreply, the large-scale storage of electricity and hot and cold water is such a problem that the forseeable solar technologies could not be applied to community-size power plants. Single building roof units and basement storage tanks or batteries are thus seen as the most realistic choices for the near future.

Three Texas chemical engineers have devised a plan for large-scale energy storage, that, they believe, could make a community-sized solar power system possible. R.R. Davison, W.B. Harris and John H. Martin describe their "Solaterre system" in the December CHEMTECH. The system would use aquifers, water-bearing underground formations, to hold hot and cold water for space heating and cooling up to 3,000 homes. Hot water would be collected in the summer in huge solar collectors and cold water would be collected in the winter from a cooling pond. The earth is such a good insulator that they project a loss of only five percent of the heat or cold during storage.

The team used the Ogallala aquifer and the city of Lubbock, Texas, as models. They suggest that the Solaterre system could be installed for less per residence and would cost less to operate than most other solar power designs.

EPA acts on PCB's, pesticides

The Environmental Protection Agency has acted on three chlorinated organic chemicals—chlordane, heptachlor and PCB's (polychlorinated biphenyls).

The first two are pesticides used widely in household insect sprays and for a variety of agricultural products. EPA Administrator Russell E. Train issued an intention to suspend most uses after studies showed that heptachlor causes tumors in mice, is concentrated through the food chain, and can be found in most human foods and body tissues sampled. (SN: 9/9/75, p. 77). Chlordane contains 10 percent heptachlor. In his latest action, Train carried out his intention and suspended most uses, pending the results of cancellation hearings. Their continued use, he stated, would create an "imminent hazard" of human cancer.

Relatively high levels of PCB's, fire-resistant liquids used in electrical equipment, paints, inks, plastics, adhesives, sealants and hydraulic fluids, have been found routinely in air, soil, water and animal tissue samples. Although EPA has no authority under present law to regulate PCB's, Train announced an "action plan" to reduce levels of production and discharge and to seek an eventual halt to all production and use in the United States. He directed EPA regional offices to crack down on PCB discharge by manufacturers and large-scale users of the chemicals, and has called for voluntary self-regulation by both groups. He also urges the development of safe alternatives to PCB's. The chemicals, Train noted, cause tumors, skin lesions, gastric disorders and miscarriages in mammals, and about 300 million pounds of the 700 million manufactured since 1929 remain in the air, water and soil.

BIOMEDICINE

Behavior therapy for self-starvation

Anorexia nervosa is a baffling psychosomatic disease whereby the patient, often a young woman, attempts to starve herself to death. The therapeutic approach of recent years, appetite-stimulating drugs combined with psychotherapy, has proven largely ineffective.

F. Wulleimier, F. Rossel and K. Sinclair of the University Psychiatric Polyclinic in Lausanne have tried a new therapy based on reward and punishment. It is three times more effective than the other one, they report in the JOURNAL OF PSYCHOSOMATIC RESEARCH (Vol. 19, No. 4, 1975).

They gave eight patients the classic treatment. Another nine patients were given behavioral therapy. Patients who gained weight were rewarded with walks, visits with friends and parents, and so forth. Patients who did not gain weight or lost it were punished by being forbidden to leave their rooms, see friends and families, listen to the radio, and so forth. Wulleimier and his co-workers then compared the speed of weight gain between the two groups of patients and found that those undergoing behavioral therapy gained weight three times faster.

They admit, however, that weight gain in the hospital does not guarantee that the patients will keep it out of the hospital.

Nucleotides in the human genome

Precisely what nucleotide sequences comprise the genome (gene package) of each of the 180 trillion cells in the human body? Investigators aren't sure, but they are solving some of the mystery.

Carl W. Schmid and Prescott Deininger of the University of California at Davis studied the organization of three classes of nucleotide sequence—single copy, repetitive and inverted repeated sequences—within the human genome. They found that repetitive sequences were distributed throughout 80 percent or more of the genome. Slightly more than half of the genome was found to consist of short single copy sequences, interspersed with repetitive sequences. The average length of the repetitive sequences was also found to be small. The inverted repeats were found to be essentially randomly positioned with respect to both sequence class and sequence arrangement, so that all three sequence classes were mutually interspersed in a portion of the genome.

So the human genome appears to contain highly ordered sequence arrangements resembling those found in lower animals like the sea urchin, the chemists conclude in the latest issue of CELL (Vol. 6, 1975).

Muscles can't beat the heat

Heat appears to take more of a toll on exercising muscles than cold does, according to a report in the EUROPEAN JOURNAL OF APPLIED PHYSIOLOGY (Vol. 34, No. 3, 1975).

W.J. Fink and colleagues at Ball State University studied the metabolism of men exercising on cycles under both hot and cold conditions. Oxygen uptake, heart rate and rectal temperature were all significantly higher during exercise in the heat, they found. Sugar use by muscles was significantly greater in heat. However the one thing that cold seemed to affect more than heat did was the level of fats in muscles. The level declined 23 percent in the cold and only 11 percent in the heat.

This study, the investigators conclude, supports the concept that oxygen supply to working muscles is reduced during heavy exercise in warm environments, thereby accelerating the rate of sugar depletion in the muscles. These effects, along with decreased fat stores, may, in part, be responsible for the exhaustion frequently observed during exercise in the heat.