of Information Act has gained stories for *Science Trends* on topics such as the NSF's relationship with NOVA, the science television series of which NSF is a minor sponsor; the costs of an NSF-Cornell University dedication ceremony to mark the resurfacing of the Arecibo telescope; a shortage of funds to support an expansion negotiated by the National Academy of Sciences in the exchange program with the USSR; a scheme under consideration in the NSF to cut administrative costs by awarding fewer but larger grants; and criticisms by members of the NSF's advisory committee for research which led to the committee's abolition.

Kranish's differences with the NSF are hard to adjudicate (and a fellow reporter probably should not even try to), not least because of the frictions the dispute has engendered. Kranish calls it a "sometimes bitter controversy." NSF officials decline to characterize it that way but have clearly been put on edge by his hard line posture. Kranish has even threatened to sue the agency for defamation because it gave *Science* a report prepared for internal purposes which sets out the NSF's defense to Kranish's charges.

Feeling among agency officials is that although most of the facts in Kranish's article are correct, they are in some cases one-sided, and are in general unfair. Kranish, for example, accuses the agency of taking "a severe anti-information stance." But the NSF has provided him with "literally thousands" of documents, says Renirie. (The *Science Trends* article concedes that hundreds of documents have been made available, but says that this was done "sometimes voluntarily, sometimes under threat of court action.")

According to Renirie, many of the documents which Kranish has asked for under the Freedom of Information Act would have been made available even without the act. The NSF may even have been more open than the act really requires; in Renirie's view, the act provides for public access to particular documents, but he questions whether it was really intended to permit fishing expeditions, such as reading through all the correspondence of the NSF director. Yet this Kranish has been allowed to do. "I deeply believe that this agency is the most open you will find," Renirie says.

Kranish, on the other hand, feels strongly that the agency is not being as open as the law now requires, and that he is within his rights to press as hard as he can. Other reporters covering the NSF certainly stand to benefit from his single-handed efforts to get the maximum advantage from the act. It is perhaps only to be expected that the NSF should put up occasional resistance, particularly while the exact meaning of the act is still under test. The differences between Kranish and the agency are perhaps not so much a matter of rights and wrongs but a natural tension between the possessors and dispensers of information which will persist until the new rules of the game become established.

—NICHOLAS WADE

# Briefing

## Rad-Wastes and the Next Civilization

Some strange perspectives on the problem of dealing with radioactive wastes are afforded in a major new assessment commissioned by the Energy Research and Development Administration. The study,* assembled for ERDA by the Battelle Pacific Northwest Laboratories, comes to no conclusions but describes both the proved and the possible techniques for coping with the wastes from nuclear power plants.

The Methuselan life-span of certain radioactive wastes compels the authors of the ERDA report to think ahead ten thousand years and more. It is "reasonable to assume," they say, that there will be another ice age within this period, so that the waste depository must be able to withstand sea level lowering, crustal adjustment, vast climatic change, and the other rigors of a glacial epoch.

With due humility, the authors go on to recognize that this particular civilization may not be around in ten thousand years time. They therefore give serious consideration to what would happen if a future civilization should unknowingly sink drillholes in the area of the waste depository. To reduce such a possibility, the Battelle authors say, the depository should not be located in any mineral rich area which future civilizations might decide to mine. Even if drilling were to take place, the chances of a direct hit on a radioactive waste canister are small. Should a hit occur nevertheless, "It seems logical to assume that any civilization having the technical capability to drill hundreds of meters into the earth in search of energy resources would also have the sophistication to recognize a waste repository."

At present the most favored option for dealing with long-lived wastes is by burial in stable geological structures such as salt beds. But the Battelle authors pay careful attention to more exotic methods that may become competitive in the future, such as emplacement in ice sheets, or on the deep ocean floor, or in space.

Ice sheet burial is a particularly intriguing way of bidding farewell to the wastes. One method is simply to place the canisters on the surface of the Antarctic ice cap. Through the heat generated by the decaying wastes, they would melt through the ice at the rate of a meter to a meter and a half per day, striking rock bottom after a 5- to 10-year descent. Attaching an anchor to the canister would stretch the journey out to 30,000 years.

A more ingenious scheme would be to arrange matters so that the density of the waste canister is intermediate between that of ice and water. In this case the rate of descent would be much slower, and once the canister ceased to generate heat, it would descend no faster than the ice particles in which it was embedded.

The only impediment to these proposals is that an international meeting held in 1974 declared the Antarctic ice sheet to be an unsuitable site for the disposal of radioactive wastes.

Though the Battelle report refrains from evaluating the disposal technologies it describes, others have not scrupled to do so. Secretary of Commerce Elliot L. Richardson assured the Joint Committee on Atomic Energy last month that, from the data in the Battelle report, he was "confident that we will be able to safely handle radioactive wastes from the nuclear power plant program.

Despite its importance, the problem of nuclear waste disposal has received only fitful attention from the federal government and the merest fraction of the overall funds devoted to nuclear power development. Though salt mine burial is the likeliest option for the immediate future, the government's first site of choice, at Lyons, Kansas, proved unsuitable, and the second, in New Mexico, is still under evaluation. George D. DeBuchananne, chief of the Geological Survey's Office of Radiohydrology, believes a safe salt site can eventually be found but considers that too little work has been done to be sure that salt is better than other geological media.

—NICHOLAS WADE

*"Alternatives for Managing Wastes From Reactors and Post-Fission Operations in the LWR Fuel Cycle." Obtainable from the Division of Nuclear Fuel Cycle and Production, ERDA, Washington, D.C. 20545.