Letters

Nuclear Waste

Daniel E. Koshland, Jr.'s editorial of 27 June "Dealing in hot property" (p. 1585) was a flippant statement far beneath the standards of *Science*. The difficult problem of nuclear waste storage deserves serious explanation.

There is a "political problem" caused by increasing public awareness that scientific experts are not infallible. That problem is best addressed by assuming that the public is not stupid and wants clear explanations of alternative procedures for long-term nuclear waste storage.

Public doubt about any easy fix reflects a widely shared concern for future generations that Koshland would be wise to emulate. Too long we Americans sought the fast buck with no regard for environmental consequences. The sense of stewardship that has come out of the environmental movement deserves support from *Science* rather than smart-alec put-down.

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Koshland's editorial on radioactive waste unfortunately juxtaposes a serious suggestion—massive compensation—with a frivolous suggestion—controlled leakage of information on the hazards of radioactive disposal. I fear that by this juxtaposition, Koshland may have discouraged serious discussion of massive compensation as a vehicle for resolving the waste issue.

The states of Washington, Nevada, and Texas, which are candidates for the first geologic repository, and Tennessee, the candidate for the Monitored Retrievable Storage facility (MRS), have all indicated their intention to veto their selection. By terms of the Nuclear Waste Policy Act of 1982, a state veto can be overriden by simple majorities in the House and Senate. Should this occur, our country may well be embroiled in a nasty state-federal confrontation—indeed, the situation has the making of a constitutional crisis perhaps as severe as the Little Rock school segregation crisis of the Eisenhower era.

That this scenario is not overdrawn is suggested by our experience in Tennessee with the proposed MRS. Although the city of Oak Ridge, the proposed site, has welcomed the MRS, both the state legislature and Governor Alexander have declared their opposition to it. Governor Alexander, although conceding that the MRS would be safe, objects because he believes MRS in Oak Ridge would project a poor image that would discourage high-tech industry from coming to Tennessee.

Koshland and Governor Alexander both agree that MRS poses minimal hazard: there can be no technical fix for what is already fixed. Under the circumstances, Koshland's compensation scheme may be the only way to resolve the issue without invoking a constitutional crisis.

I have proposed that a rent of $100 million per year be offered to a state that accepts either MRS or a geologic depository. This offer must be made publicly, massively, and at the outset. Elected officials who are inclined to invoke the publicly popular NIMBY (Not In My Back Yard) principle would then have to explain to their constituents why they turned down a subsidy that, over the 40 years of operation of MRS, would amount to $\$4 \times 10^9$.

One hundred million dollars per year amounts to a levy of 0.2 mills per kilowatt hour on the nuclear electricity generated in the United States. This is 20 percent of the current levy mandated by the Nuclear Waste Policy Act and would add less than 0.2 percent to the average price of U.S. nuclear electricity.

To those who view such compensation as an unconscionable bribe, I can only say that a bribe becomes a golden opportunity if it is sufficiently generous! And $\$100 \times 10^6$ per year is an offer that, as the Godfather says, cannot be refused, as well as being an amount that can be afforded by the nuclear industry.

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Those of us who take more seriously than Koshland the problem of disposing of materials that will be poisonous for thousands of generations, precisely because we *do* understand the technical issues involved, find his attempt at humor misplaced. It is surely unnecessary to recount the events of the last 25 years that have taught many Americans that "public officials" are among the *least* credible sources of factual information. Poking fun at this healthy skepticism seems out of place in a journal of science. And cloaking oneself in the haughty, elitist robes of scholarly certainty only frustrates honest efforts by others to probe, to question, and to find the true facts, the best solutions.

A thousand years from now, barrels once safely stored far underground may begin to leak, and the geology of which we are now so proud may prove to have lethal limitations. Should any copies of *Science* survive until such a day, I hope that the 27 June 1986 issue is one of them. Students of that era might then learn what sort of arrogant creatures we were, that so easily left our deadly garbage for children of the future to clean up.

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I always expect Koshland's editorials to be informative and thoughtful, but "Dealing in hot property" was a marvelous lampoon. Both the "establishment" and the "counterculture" took some well-deserved hits. Yet I feel some serious discussion needs to be proffered on the subject of nuclear waste disposal.

The Department of Energy (DOE) has the unenviable task of determining the feasibility of disposing of nuclear waste in a geologic repository. There are currently hundreds of excellent scientists employed in this investigation. The techniques used to study the problem are at the cutting edge of science and technology. It is necessary to advance the state of the art in many fields in order to solve the riddle of deep geologic disposal.

Deep geologic disposal may or may not be the best answer to the nuclear waste issue. Studies done thus far indicate many promising aspects for this method, but considerably more testing is needed. The myriad of technical questions can and probably will be answered within and to the satisfaction of the technical community. However, this is also a political issue, so the general public must be convinced that the process of this investigation will be sufficiently comprehensive and honest in order to select the "best" site available.

The process of siting a nuclear waste repository must be an adversarial one. To maintain an intelligent, informed discussion of the issues, channels of communications must be available to all interested parties. The DOE must maintain an open and frank posture when dealing with those who must live with the final decisions. Only by following such a policy can bitterness and the backbiting arguments with the general community be minimized.

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Koshland's editorial "Dealing in hot property" displays such a remarkable degree of scientific arrogance and antidemocratic nonchalance that it brings into question how much confidence an informed scientific public should have in those responsible for

the honest dissemination of information.

The scientific public is well aware of the almost legendary unwillingness to communicate and compromise that describes the technological cognoscente, but faced with the unfortunately obvious failures of modern technology—the space shuttle, Chernobyl, Bhopal, leaking underground storage tanks, DDT, acid rain, Three Mile Island, ozone damage, and so forth, the nonscientific public has been made aware that they must abandon their blind trust in technocrats and play an active role in ensuring the survival of the species. The technological community will have to satisfy legitimately the demands of an increasingly informed public, and if they cannot successfully convince the public that their ideas are safe and useful, they will have to withdraw. It is the hallmark of a democratic society that an informed public pursues its own self-interest. Secrecy and bribery, Koshland's "cure" for the nuclear waste problem, can only heighten the public's repugnance for nuclear power.

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Koshland's tongue-in-cheek editorial on using political and economic tactics to overcome local opposition to a nuclear waste storage facility contains the seed of a fruitful idea, but a more serious approach may be more productive. In particular, several interesting connections exist between siting the waste facility at Yucca Mountain on the Nevada Test Site (the best location on the combined grounds of geology, hydrology, low population, government control, and existing radioactive contamination) and ending the testing of nuclear weapons there.

The main hazard of nuclear waste storage, of course, is the accidental release of radioactivity. But since weapons testing involves the same hazard to a far greater degree, by trading storage for testing the people of southern Nevada and southwestern Utah would actually *reduce* their risk of radioactive exposure.

In addition, the economic benefits of the waste storage facility are real, so the "pork barrel" incentives Koshland suggests are probably unnecessary. Such a facility would provide about 1000 permanent jobs, thus substantially compensating for the loss of about 3000 similar jobs at the Test Site. And while a museum lit by Čerenkov radiation may be a joke, the storage facility really could include an off-site visitor center to explain to passing tourists how it operates. Perhaps Koshland's venture capital group should consider setting up a souvenir shop next door.

In fact, the waste storage facility should be a source of pride for the local residents. They would be helping to solve the serious long-term problem of nuclear waste, and for this they would deserve the thanks of our generation and its descendants. This contrasts sharply with weapons testing—while a few persons strain to find moral and technical justification for this activity, most understand that the likely end of the arms race it perpetuates will be our generation's having no descendants.

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Erratum: In the briefing "AIDS case dismissed on legal technicality" by Deborah M. Barnes (News & Comment, 25 July, p. 414), the date when Robert Gallo and his associates were awarded a patent for developing a test to detect antibodies in blood samples of people contaminated with the AIDS virus was incorrect. It should have been May 1985, not May 1984.