Office of Technology Assessment to become president of the National Audubon Society, will seek to have the commission return to the Beyea-Von Hippel report when it prepares its recommendations. He believes strongly that the report is correct in its insistence that there is "an imbalance between the enormous resources . . . devoted to *accident prevention* and the almost negligible resources . . . devoted to the development of *consequence mitigation strategies*" (emphasis in the original).

"We came awfully close to a catastrophic accident at Three Mile Island," Peterson told *Science*. "The combination of circumstances and events which occurred there say to me that the probability is high that sometime, someplace there will be a catastrophic accident. The [Beyea-Von Hippel] report should therefore be taken damned seriously."

Peterson noted that the report indicates that, if a large release of radioactivity had occurred and been carried by a southwest wind over northern New Jersey and New York, more than $7\frac{1}{2}$ million people would have been in the path of the invisible radioactive plume.

The report does not attempt to assess quantitatively the probability of a reactor accident involving a large release of radioactivity, nor does it deal with the question as to how near the Three Mile Island accident came to a large release. What it does is set forth some of the possible long-term consequences for distant populations and areas—50 miles or more downwind—had the accident been worse and the releases larger.

These scenarios range from one describing an accident just slightly more severe than the one that actually occurred, to one involving the meltdown of a "mature" reactor core (fuel in the core at Three Mile Island had been irradiated for only 3 months and contained far fewer long-lived fission products than the average reactor core), a breach of the containment, and a major release of radioactivity of the kind hypothesized in the Rasmussen study. In the latter case, the numbers of "delayed cancer deaths" (occurring over a 75-year period) attributable to the accident are estimated at from 550 to 60,000, excluding the cancer deaths suffered in the population living within 50 miles of the reactor.

In arriving at the higher number the authors assumed that the plume of radioactivity is blown toward New York City, and they used the "most pessimistic coefficient relating dose to health effects." Conversely, they based the lower number partly on the assumption that the plume is blown toward Maryland's lightly populated Eastern Shore and partly on the most optimistic reckoning of the coefficient of dose to health effects. The incidence of genetic defects attributable to the radiation release is held to be roughly equal to the incidence of cancer deaths.

The report also estimates that, for the worst release, there would be from 3500 to 450,000 cases of benign thyroid nodules, many of which would require surgery. For the smallest release (with 5 percent of the iodines and 60 percent of noble gases escaping from the containment) the report estimates that there would be from 200 to 27,000 nodules, but only 3 to 350 fatal cancers.

All significant releases of radioactivity would lead to temporary contamination of land areas ranging in size from 25,000 square miles to an area several times that of Pennsylvania. If iodine-131 should be the most dangerous nuclide released, the contamination would be relatively brief, for it has a half-life of only about 8 days. More severe accidents resulting in the release of cesium (which has a 30-year half-life) and other long-lived fission products would cause the contamination of up to 5300 square miles for years. In such circumstances, the population would have to be relocated and massive efforts at decontamination undertaken.

"Delayed cancers and genetic defects due to radiation from ground and buildings contaminated with long-lived radioactive cesium could be one of the largest consequences from a major release," Beyea and Von Hippel say. "Research on decontamination should be given a high priority."

Addressing the question of how to respond to a major reactor accident, the authors point out that to try to evacuate people living in the path of the radioactive plume simply would not be practical at distances greater than 50 miles from the reactor site, if indeed it would be practical beyond 10 or 20 miles.

They say, however, that the "availability of thyroid protection medicine, sheltering in buildings, and air filters could all prove valuable in reducing radiation doses and the associated increased incidence of thyroid damage, cancer, and other effects of low-level radiation. . . ." Emergency planning for areas from 50 to 100 miles or more distant from specific reactors "may require cooperation between different states and, in some cases, cooperation with Canada and Mexico," they said.

They recommend that containment buildings for existing reactors be backfitted with systems for the rapid filtration of "large volumes of radioactivity-con-

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Carter's Tellico Decision Offends Environmentalists

"Jimmy Carter has just lost 10,000 doorbell pushers in California," said Brock Evans, the Sierra Club's Washington director, apropos of the President's decision on 25 September not to veto the public works appropriations bill that mandates completion of the long-controversial Tellico Dam on the Little Tennessee River, home of the snail darter. What Evans meant was that the environmental community is now disappointed enough in Carter that, even if environmentalists in California and other states do not vote against him in the primaries and general election of 1980, they are unlikely to work for him, as many did in 1976.

Evans and several other environmental leaders commented bitterly on the President's decision at a Washington press conference. Evans said the Tellico decision is one of several "very serious hammer blows" Carter has dealt environmental interests this year. The other blows, he said, include Carter's decisions to increase the allowable "cut" in the national forest system and to propose an Energy Mobilization Board that could bypass environmental clearance procedures and maybe waive pollution control laws.

According to White House sources, the President knew full well that his decision to sign the appropriations bill would be strongly resented by environmentalists. The Tellico Dam issue is said to have put him in a genuine dilemma. He had pushed efforts to do away with the water projects pork barrel, of which the Tellico project had become a symbol (it was largely on economic grounds that the Tellico project was denied an exemption from the Endangered Species Act by a Cabinet-level council set up by Congress last year to review such cases). If the President signed the bill and thus allowed the dam to be completed, water policy reform would suffer a setback and his standing with the environmental groups would suffer. On the other hand, White House lobbyists who work the House and Senate were telling him that, if he vetoed the bill, the Endangered Species Act might be gutted or allowed to expire,

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and other legislation (such as the administration bill to establish a department of education) might suffer.

Carter finally signed the bill after being assured that he would get something in return, including strong support for reauthorization of the Endangered Species Act and for creation of an independent water projects review board, which the pork barrelers in Congress want no part of. In an effort to assuage the feelings of environmental leaders, the President went to unusual lengths to see that they were told why he felt he had to sign the bill. Several were surprised to receive calls at mid-evening on 25 September from President Carter himself, who was aboard Air Force One.

One of those so favored was Russell Peterson, president of the National Audubon Society. Peterson is more inclined to commiserate with Carter on the Tellico issue than to criticize him. "I told him I was disappointed in what he had done," Peterson told *Science*. "But I think it's inappropriate to beat on the President when the real culprits are in Congress." He added that the public works pork barrel is a national disgrace. "Why the country continues to tolerate it is hard for me to understand."

But, as Peterson's remark indicates, the pork barrel is a highly durable congressional institution. It will almost surely outlast the Carter Administration, even if the reports of wholesale political desertions from the President's camp, now reaching even to the environmental community, should turn out to be exaggerated.

Running on Empty

To fill up his tank, the owner of a standard-sized American car would pay $58 in France, where gasoline now costs $2.90 a gallon. In this country the price of a fill-up is about $20, but in 5 years it could exceed $50 here, too. So says the World Watch Institute, a Washington-based policy research organization, in its new study *Running on Empty: The Future of the Automobile in an Oil-Short World.*

The study, written by Lester R. Brown, Christopher Flavin, and Colin Norman, says, "The automobile is now caught in a double bind. It will be affected not only by the leveling off of world oil production, but also by the fact that it will be competing with more essential claimants for scarce oil supplies. Producing food, powering factories, heating homes, and running trucks and buses will all require increased amounts of fuel in the years ahead. In this competition, the automobile will be hard pressed to hold its own."

Many Third World countries, the authors predict, will never have the large fleet of passenger cars they have dreamed of. Industrial nations that have auto-centered transportation systems will have to allow a bigger place for public transportation and such increasingly popular means of getting about as the bicycle and the moped.

The American's infatuation with the automobile has been repeated in other countries. There are now some 300 million cars worldwide, with roughly one third of them in the United States and another third in Western Europe and Canada. According to the study, while automobile ownership in the United States increased by 50 percent between 1950 and 1960, it doubled in Britain, tripled in France, and quadrupled in West Germany. Since 1960, growth of automobile ownership has slowed in the United States and the more advanced Western European countries. But in Japan and some other countries, it has accelerated astonishingly. Whereas there were only 1 million cars in Japan in 1960, today there are 34 million, one car for every four Japanese. Even in the Third World, automobiles abound in big cities that have a large wealthy class. São Paulo and Mexico City, for instance, are said to have more automobiles than Philadelphia or San Diego.

The World Watch study says the automobile "will not find ready salvation in the development of alternative fuels" such as alcohol, liquid fuel from coal, and oil from shale and tar sands. Production of these fuels is said to face "severe economic, environmental, and social obstacles" that will limit their use. If salvation is possible, the study indicates, it will come through development of more fuel-efficient cars and widespread adoption of alternative modes of transportation, together with a shift to patterns of urbanization that are less dependent on the automobile. In many countries, the government's response to the automobile's endangered future has been ambivalent, the study says, because the production and sale of automobiles generates jobs and economic growth even as it leads to increased oil imports and uses up available foreign exchange.

Failure to face up to the scarcity and rising cost of fuel is held to be especially damaging in Third World countries that must import all or most of their oil. "Many countries are now using the bulk of their export earnings to pay skyrocketing oil import bills," the study says. "Such vast expenditures threaten economic and social development programs. In view of such problems, many Third World governments may decide to limit growth of their automobile fleets one way or another."

Agent 007

Technology and James Bond are ready to come to the aid of the top business executive, diplomat, or government official who fears he is marked for terrorist attack.

Communications Control Systems of Washington, Ltd., a subsidiary of a New York countermeasures and countersurveillance firm, is offering for sale a bomb- and bulletproof Cadillac with some remarkable options. Meant to be the first of many such conversions if it finds a market, the car offers a lot, even at $245,000.

It can be started remotely, from as far as a quarter of a mile away, to protect the driver from any explosives wired to the ignition system. It can lay down an oil slick to thwart a pursuing car, it contains electronic bug-detection and kidnap-victim recovery systems, and it even harbors a two-wheeled escape vehicle.

Edward Williams, the company's Washington manager, says inquiries have been received from prospective clients in this country and abroad. The company decided to produce a terrorist-proof car partly on the strength of predictions by Risks International, a group of retired military officers and civil servants, that an outbreak of terrorism in the United States is imminent.

Luther J. Carter