as management decides. Under these rules, joint ventures with companies from the West are expected to become common, bringing in fresh capital.

A variety of pressures may help to ensure that some of that capital is invested in cutting down pollution. A recent public-opinion poll, the first carried out in East Germany with the help of Western pollsters, put the environment at the very top of the issues that concern the East German people; promises to protect the environment have become part of the platform of every one of East Germany's new political parties as they prepare for the 6 May elections.

It will no doubt take some time for these changes to be translated into political reality. As a result of decades of government repression, East Germany has no organized environmental movement, although it seems likely that under the newly relaxed conditions such a movement will develop rapidly. For similar reasons there are very few activist scientists, but some who toiled on environmental issues in academia are now taking important roles in the government.

For the moment the environmental policies of the central government remain in turmoil. The Minister of the Environment, Hans Reichelt, was recently replaced by Peter Dietrich of the Democratic Farmers' Union, one of the parties allied with the ruling Socialist party. Civil servants in the Ministry in Berlin say the future structure and responsibilities of their ministry are very much up in the air.

Indeed, nothing East German is certain these days. But the environment has clearly emerged from the closet, and is now caught up in political debate that has a distinctly Western flavor, mingling political parties, public opinion polls, public relations directors, fines for polluters, and the profit motive. And although some East Germans worry about exchanging the evils of socialism for those of capitalism, those worries apparently don't extend to environmental issues: there is a consensus that the Western countries have done better than those of Eastern Europe in protecting the environment.

During a long talk one evening with a top manager of one state-owned East German enterprise, he repeatedly mentioned the steps Western companies had taken to reduce emissions of harmful chemicals—steps his own firm had not bothered to take. At the end of the evening, after reciting his litany of failure, the manager concluded with disgust: "The system is useless."

■ DANIEL CHARLES

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The Fluoride Debate: One More Time

Alexander Lowry/Photo Researchers

A new study on cancer potential may revive arguments about the treatment of drinking water that began in the 1940s

THE 40-YEAR-OLD CONTROVERSY over the use of fluoride in drinking water threatens to erupt from dormancy this month as the government gets ready to make public new data on fluoride's cancer-causing potential.

Since the 1940s, sodium fluoride has been added to toothpaste and public water systems to prevent tooth decay. Opponents have resisted the practice as forced medication—or worse, as a poisonous conspiracy. They hope to use the new toxicology data to buttress their case.

The new animal studies, directed by the U.S. National Toxicology Program, have not been released. But already the word is out that some as yet ill-defined abnormalities have been spotted in one rodent species.

Public officials have known that trouble was brewing since August, when a memo from the office of Michael Cook, the chief drinking water official at the Environmental Protection Agency (EPA), noted: "Very preliminary data. . . indicate that fluoride may be a carcinogen." While EPA has not elaborated on the August memo, officials are bracing for intense publicity. Anti-fluoridationists have long argued (and have been ridiculed for arguing) that fluoride causes cancer. Now they may have a chance to score a few points, and they probably will not show restraint, even if the data are equivocal—as they probably are.

"My phone is ringing off the hook," says John Bucher, the reviewer at the National Toxicology Program who has the unenviable task of interpreting the data. The studies began under his direction in 1985, and he is scheduled to present the results to an in-house panel this week. A public hearing is set for 12 March. Bucher says: "The anti-fluoridationists have whipped the press into a frenzy," and reporters are calling every day, asking him to confirm that fluoride is a carcinogen. He firmly declines to comment.

Meanwhile, EPA—also under pressure to look at carcinogenicity—announced on 3 January that it will undertake a review of new fluoride literature to bring its standards up to date. The last review took place in 1986, when EPA set the maximum allowable concentration of sodium fluoride at 4 parts per million, four times the "recommended" amount that many towns use to prevent tooth decay. The agency found no risk of cancer or bone disease at that level, based on a review of the literature performed by then Surgeon General Everett Koop. The report's conclusions have since been challenged as being at odds with the concerns expressed in transcripts by his advisory panel members. A decision now to decrease the limit could be a blow to small communities where natural fluoride levels in water are high, requiring the installation of expensive filtration equipment.

More than half the children in the country now live in fluoridated water districts, and most dental health officials say this is why U.S. tooth decay rates have plummeted 50% in the last 20 years. However, if the new toxicology report triggers a change in policy, the entire scheme of fluoridation developed since 1945 could come undone.

"My God—you can well imagine the ramifications if we had evidence that fluoride was a carcinogen," says John Sullivan, deputy director of the American Water Works Association. "The toothpaste industry would go crazy," he says, not to mention his own colleagues in the water business.

Not only are fluoride's toxic effects getting a more critical look, but its benefits seem to be shrinking as well. Recent dental surveys show fluoridation to be less effective than was claimed in the past.

The anti-fluoridation lobby has been trying to draw attention to these issues since 1986, when EPA closed the books on its last review. The leader of their troops today is John Yiamouyiannis, director of the Safe Water Foundation of Delaware, Ohio, a professional "anti" and Ph.D. biochemist who has argued vehemently for years that fluoride causes cancer. He is well known to officers of the National Institute of Dental Research (NIDR), whom he routinely denounces as scoundrels. NIDR's press office responds in kind, pointing out that Yia-

mouyiannis once worked for the National Health Federation, a promoter of oddball health remedies, including Laetrile.

Yiamouyiannis claims that in its last review, EPA ignored much of the negative evidence on fluoride, including studies reporting mutagenic damage in bacteria and indications that chronic low-level exposure may cause bone diseases in humans.

Similar allegations were made inside EPA by Robert Carton, a Ph.D. toxicologist on the agency's staff who has served as president of the local federal employees' union. In 1986, the union attempted to join a suit filed against EPA by Jacqueline Warren, an attorney at the Natural Resources Defense Council. Warren charged that the scientific review of fluoride failed to comply with the Safe Drinking Water Act.

"EPA was under tremendous pressure" from the dental establishment to minimize the risks, Warren says, and "we were very disturbed by the shoddy quality of the scientific review." In particular, she was surprised that toxicologists accepted the view that fluoride-induced discoloration and thickening of tooth enamel is merely a "cosmetic" change and not a health effect. Warren thought this would set a bad precedent for control of silver residues, which can turn the skin blue. She says the EPA review was a "blatantly political" attempt to sweep problems under the rug. However, the U.S. District Court for the District of Columbia disagreed in 1987, dismissing both Warren's suit and the union's brief.

Many of the issues examined in EPA's earlier fluoride study—including the potential for carcinogenesis, enzyme inhibition, immune suppression, undesirable bone growth, and tooth discoloration—will be examined once again this year. There may be little new data of substance, aside from the carcinogenesis study. But the weighing of risks could change, because fluoride's value as a preventer of tooth decay seems less impressive than before.

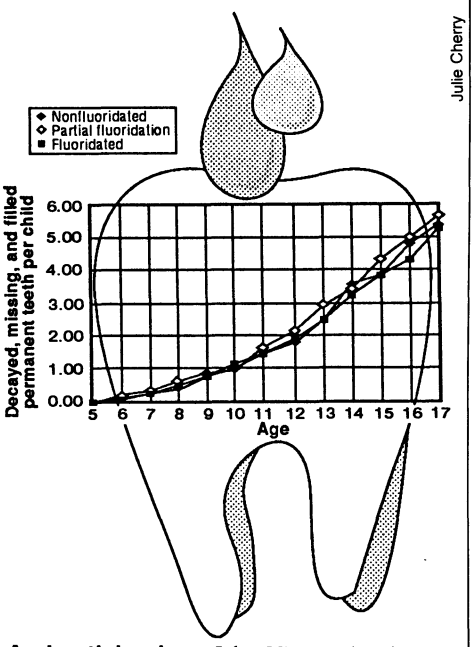
Although advocates claim that fluoridating water can reduce decay rates by 50 to 65%, and benefits like these were reported in the 1950s, they are not being found today. Recent studies by the National Institute for Dental Research have shown smaller, and declining, benefits. In 1980, for example, NIDR found a difference of only 33% between decay rates for children in fluoridated and non-fluoridated areas. In 1987, the figure dropped to 25%.

The evidence in favor of fluoridation thus seems to be weakening. The antis say there never really was proof of its effectiveness, and they claim that the new data confirm that there was bias in the interpretatin of epidemiological research in the 1950s.

On the other hand, James Carlos, NIDR's chief epidemiologist, argues that the reason it is hard to demonstrate the benefits today is that it is hard to find a "control" group that is not benefiting from fluoride. One possible reason for this is that nearly everyone now uses fluoridated toothpaste.

Both sides agree that rates of tooth decay in U.S. children have come down sharply in the last 20 years, dropping more than 50% in both fluoridated and non-fluoridated areas. But they do not agree on the cause, one saying it must be fluoridated water, the other saying it may be the result of improved nutrition and hygiene.

The argument heated up in 1988 when NIDR published its second national survey on children's dental health. As soon as the data were in, Yiamouyiannis demanded that NIDR turn them over. Carlos refused. "I thought we were not obliged to release data until after we completed our analysis," Carlos says. Yiamouyiannis appealed under the Freedom of Information Act and got the files.



A skeptic's view. *John Yiamouyiannis compiled this analysis from 1987 U.S. data, showing no difference in decay rates for children in fluoridated and non-fluoridated districts.*

To no one's surprise, Yiamouyiannis got a result at odds with NIDR's, finding that the difference between tooth decay rates in fluoridated and non-fluoridated areas was trivial, 5% at most. He also claimed that NIDR had misclassified data in a way that favored the pro-fluoride view. Carlos denies this and counters that there are classification errors in Yiamouyiannis' work. No one has offered to serve as referee.

Are the benefits of fluoridation looking smaller now because the new studies are more accurate? Carlos says this is not the case. The old and new studies are equally valid, he claims. The difference is that fluoride is "ubiquitous in the environment" today, whereas 40 years ago it was not. Carlos' assumption is that children in non-fluoridated areas are getting more fluoride in their food and drink than before. Carlos concedes, "We don't have good data" on this point, but "we're pretty sure that that's the reason."

Not everyone agrees. For example, Donald Taves, a coauthor of the 1977 National Academy of Sciences "Drinking Water and Health" report, warns that it may be wrong to lay a great deal of stress on dietary fluoride levels. Taves says that his own studies 10 years ago showed that levels "really had not changed" since the 1940s, and changes in nutrition could be just as important.

Anti-fluoridationists cite data from abroad to argue that nutrition and dental hygiene are at least as beneficial as fluoridated water. John Colquhoun, a former dental health official in New Zealand once charged with promoting fluoridation, claims today that children in non-fluoridated areas in his country score at least as well on tests of dental health, if not better, than children in fluoridated towns. Likewise, Mark Diesensdorf of the Australian Institute of Health pointed out in *Nature* in 1986 that the rates of tooth decay for children are dropping rapidly throughout Europe, Australia, and the United States, both in fluoridated and non-fluoridated areas. He suggests that changes in diet, better "immune status," and possibly the wider use of "topical fluorides" such as toothpaste may account for the improvement.

Carlos responds that other foreign studies show that stopping fluoridation where it was already in effect led to an increase in tooth decay. And Ernest Newbrun, president of the International Association for Dental Research and a member of the School of Dentistry at the University of California, San Francisco, says that "a dozen studies" from the United Kingdom "consistently show an appreciable difference between children in fluoridated and non-fluoridated areas." This proves, to his way of thinking, that the benefits of water fluoridation are as great now as ever.

The debate over fluoride draws its energy from deep, emotional sources. While the next round may examine the subject in finer detail and be more constrained by scientific politesse than those of decades past, it does not appear to be headed toward a consensus. As John Sullivan says, "We've debated this for 40 years, and I think we're getting ready to debate it for 10 more."

■ ELIOT MARSHALL