posures; he says that such repeated exposures are more potent in terms of producing bodily damage than a single larger but sublethal dose of the agent. Tardiff asserted that other chemicals, including polychlorinated biphenyls (PCB's), barbiturates, and alcohol potentiate the toxic effects of carbon tetrachloride, and that persons who already have liver or kidney damage are more susceptible to the chemical than the normal population. According to Tardiff, water containing 150 ppb of carbon tetrachloride, a concentration within the range found in the slug, would cause further damage in about one-fourth of those with liver or kidney disease and might also harm those exposed to the other chemicals.

There is also the possibility that repeated exposure to small doses of carbon tetrachloride may cause cancer. The chemical causes liver cancer in rats, hamsters, and mice when administered to the animals by a variety of routes. There is little evidence that it does the same in humans, but many investigators prefer to err on the side of caution in this regard and minimize human exposures as much as possible. For example, Samuel Epstein of the University of Illinois Medical School said in another affidavit filed in support of EPA's case against FMC that there is no known method for setting safe levels of exposure to chemical carcinogens and that contamination of drinking water with carbon tetrachloride poses a serious health hazard. According to Epstein, in some animal studies, even the lowest doses caused cancers. In contrast, Plaa points out that most of the animal studies were performed with doses high enough to cause liver damage. Thus, the cancers might have resulted from repeated insults to the tissue rather than as a direct effect of the agent.

The issues regarding the human carcinogenecity of chemicals are as difficult to resolve as they are common in modern life. The carbon tetrachloride contamination of the Ohio River has been cleared up but it is a safe bet that a similar situation will arise again somewhere.—JEAN L. MARX

Science in Europe/Low Marks for High Technology

Neither West Germany nor Britain has succeeded in encouraging the vigorous growth of new companies based on technological innovation, according to a report just published in London and Bonn. As a consequence, both countries are likely to find themselves paying royalties to American companies for the use of technology which might just as easily have been developed and commercialized in Europe.

The report, produced for the Anglo-German Foundation for the Study of Industrial Society by Arthur D. Little Limited, shows in exhaustive detail what casual observation has long suggested: that Europe has yet to devise a social and industrial framework within which new technology-based companies can thrive. Britain has perhaps 200 such companies formed since 1950 (the starting point for the study) and West Germany, despite a much better economic performance and a considerably greater gross national product, even fewer. In each country the total sales of the new technology-based companies is around £200 million a year. Yet the United States has many thousands of such companies, with sales of billions of dollars a year, the report says.

With "honourable exceptions," such as Racal Electronics in the United Kingdom and Nixdorf Computer AG in West Germany, the performance of new technology-based firms has been unimpressive, demonstrating no particular success whether measured in terms of numbers, size, growth, or contribution to GNP and employment. As a result, the report warns, Britain and West Germany are neglecting an important channel for the exploitation of technological innovation, are failing to establish the new industries which will supply jobs and exports in the future, and are leaving themselves open to American technological domination.

The interest in the report lies in its comparison of Britain and West Germany. It shows that the failure to achieve the right climate for the exploitation of technology by small firms is not just another index of economic failure—as people in Britain might have suspected—but can also occur in an apparently vigorous and successful economy like that of West Germany. "A favourable economic climate is not alone sufficient to generate these firms," the report concludes.

Some of the inhibiting factors are common to both countries, including the generally hostile attitude toward entrepreneurship held by academic and government scientists in Britain and West Germany. Neither country has traditionally directed its research and development budget toward small firms, preferring to get the work done in government laboratories, the places least likely to produce "spin-off" companies, according to the report. In addition, the fragmented market in Europe means that a newly formed company, even if successful, finds it much harder to grow rapidly than its opposite number in the United States.

In Britain, the penal rates of personal taxation, rising to a maximum of 83 percent on earned income, mean that there are too few rich men willing to invest a few thousand pounds in a venture carrying a high risk. Personal taxation in West Germany is much lower, rising only to 53 percent, but the tax position for companies is very much less attractive than it is in Britain, making it difficult for new companies to get a start. Thus, while Britain makes it almost impossible to become rich out of income, West Germany allows people to become rich only to discourage them from using their money creatively to set up new companies.

The attempt to get around the problem by establishing risk capital organizations has been only partly successful. Britain pioneered this approach by setting up the National Research Development Corporation in 1948, but NRDC has invested only £5.0 million of its total expenditure so far of £44 million since 1949 in new technology-based companies. And, since setting up the NRDC, the British Government "has done very little else to encourage innovation," the report complains. Public discussion of the issue has been more active in West Germany, with the result that a number of new organizations and programs have been set up; too many, perhaps, the report suggests, since it is doubtful they "can achieve their full impact while their efforts remain so fragmented."

The report concludes, in any case, that direct assistance to companies such as that provided by NRDC in Britain and by the newly formed Deutsche Wagnisfinanzierungs G.m.b.H. in Germany is much less help to small companies than indirect measures such as modifications in the tax system and a better climate of opinion; "direct measures are normally a poor substitute for a favourable environment." One particular change which both countries could usefully adopt would be to allow small companies to be taxed as partnerships, as they can be in the United States. This would allow shareholders in such companies to deduct capital losses on their shareholdings from their personal income before being assessed for income tax.

But in general the report identifies so many obstacles to improving Europe's performance that little less than a complete change of attitude would be needed to have much effect. At the moment there is no sign of such a change.

And Still No JET Yet

Another attempt to launch JET—the Joint European Torus, an ambitious fusion experiment—has ended in ignominy. After a 12-hour meeting through the night of 29 March, the Common Market research ministers broke up without having resolved the dispute over where the JET is to go. Although the previous failure had led European Economic Community (EEC) Commissioner Guido Brunner to say that JET was "on its deathbed," it cannot yet be assumed that it is buried.

The most recent failure to agree stemmed from two political problems. Britain, which had been fighting to get JET on its own territory, at Culham in Berkshire, had irritated other members of the EEC the same week by making a series of intransigent statements on farm prices. (The fact that this has nothing directly to do with JET, or with the Research Ministers, does not matter. In the EEC one bad turn deserves another.) Basically, Britain wants to keep farm prices down, while the other EEC countries want them to go up. But taking a tough line on food alienated other EEC countries, who thought they might pay off the score by voting to site JET in West Germany, at Garching, instead.

The smaller EEC countries were also irritated by the suspicion that Britain had made a back-stairs deal with France, swapping French support for Culham for British support for EEC nuclear research contracts going to France. The smaller EEC countries were apparently not let in on this piece of horse trading, and when they found out they were angry enough to turn the meeting into something of a farce. Finally, France had decided that JET should be run not by the Commission of the EEC but by the member states, a formula connived at by Britain but again unacceptable to other members. As a result, the question of the site was never put to the vote, because both Britain and France realized that they would be outvoted.

The meeting finally broke up without progress, and without even an agreement on when to meet again. The French leader of the JET planning group, Dr. Rebut, a Frenchman, remarked with an almost Anglo-Saxon understatement, "The situation has become very serious." Guido Brunner warned that further delay could easily lead to a breakup of the 50-strong planning team, who are based at Culham; 15 have already left, some for the United States. In spite of all this, however, there is every chance that the JET will finally be set up somewhere. Cliff-hanging is the normal way of doing business in Brussels, though rarely has a project hung for quite so long by such a slender thread.

One Cheer for Nuclear Power

The British show a somewhat grudging acceptance of nuclear power, according to a recent public opinion survey published in *New Society*, a weekly magazine read by social workers, teachers, and those professionally concerned with the problems of society. The study was carried out by Opinion Research Centre, who questioned a representative sample of 1081 adults during the middle of March. Almost half (49 percent) said they favored the building of more nuclear plants in Britain, though more men (58 percent) were in favor than women (41 percent). Just under a third (32 percent) said they opposed more plants and 19 percent had no view.

This might at first sight look like a reasonable endorsement of nuclear technology, but the second question showed it to be at best a stoical acceptance. Asked what was the best way of tackling the "energy gap" which will appear when gas, oil, and coal run out, only 32 percent opted for building more nuclear power stations now to ensure future energy supplies. Almost twice as many (61 percent) favored doing everything possible to save fossil fuels and to continue looking for other energy sources. Almost 70 percent, however, said that nuclear plants were either very safe (15 percent) or fairly safe (54 percent), while only 19 percent said that they were not very safe.

Asked who they would be most likely to believe about the safety of nuclear plants, the respondents gave a strong endorsement to scientists. No less than 69 percent said that they would trust scientists' opinions most, against a dismal 5 percent for newspaper or TV reports and only 4 percent for the government. A trusting 17 percent said they would believe the manufacturers who built the plants.

Depressing News for Science

The British science budget for 1977 to 1978 will be 3 percent less in real terms than it was last year, the Advisory Board for the Research Councils has announced. Total spending, ignoring research commissioned by government departments, will be £249 million, an amount which, though larger than last year, is not in pace with inflation. The cuts fall heaviest on the Science Research Council, which is now working on the assumption that its funds will continue to fall by 2 percent a year in real terms until 1981. It is making ends meet by cutting hard at "big science"—high energy physics, astronomy, and space research—in order to allow for some expansion in engineering and applied science.

So far the most surprising thing about the cuts—this is the fourth year in a row in which SRC resources are down in real terms—is the calm resignation with which they have been accepted. The high energy physics fraternity is angry, and now believes that its support has fallen below the level at which the science can properly be said to be supported at all, but has made little public impact with its protests. There is a distinct feeling that the research councils, and particularly the SRC, are not fighting as hard, or as publicly, as they might to preserve Britain's scientific standing.—NIGEL HAWKES